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OF THE

American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

Edited and Published for

THE AMERICAN VETERINARY MEDICAL ASSOCIATION

By

J. R. MOHLER, WASHINGTON, D. C.

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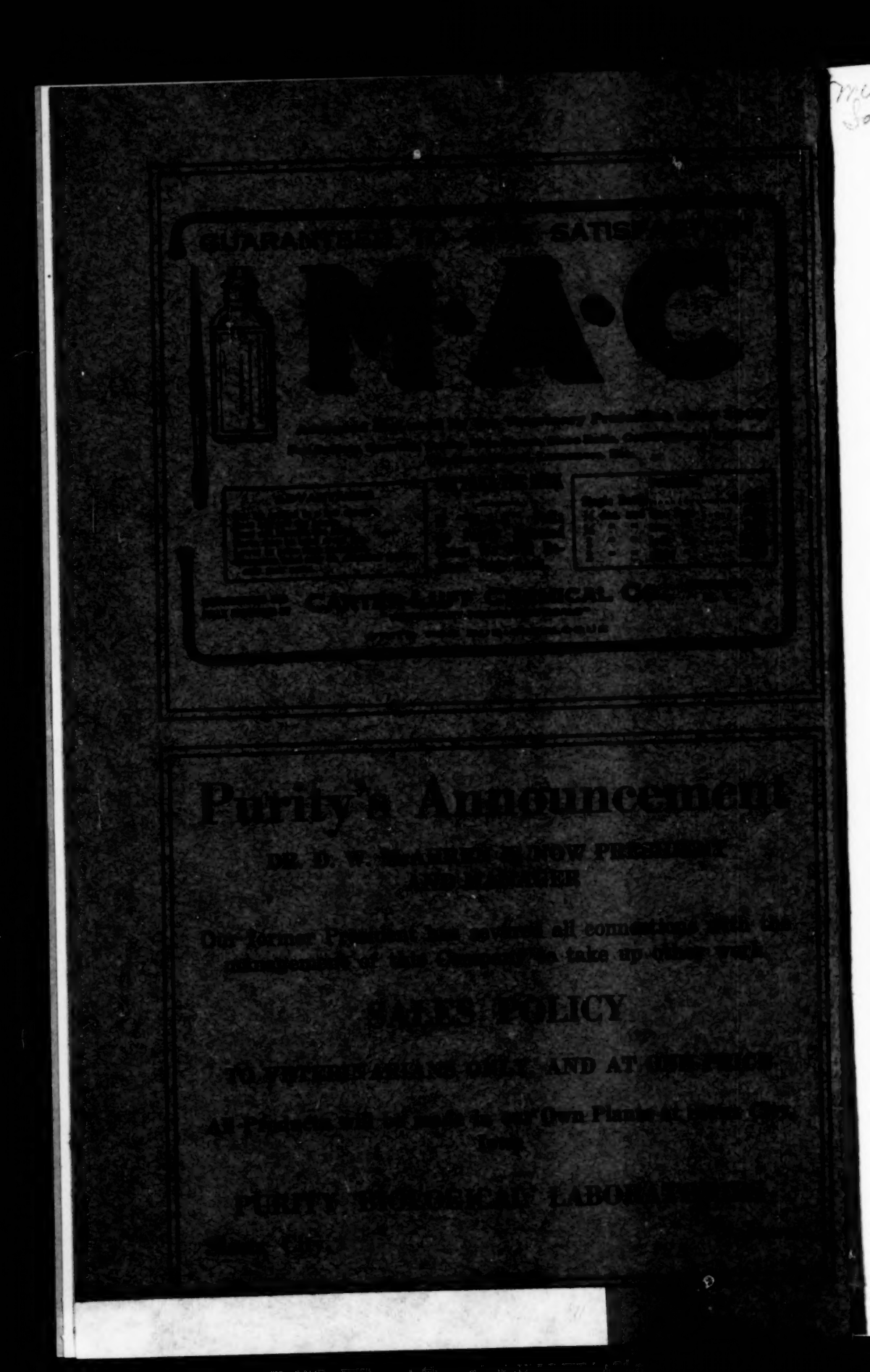

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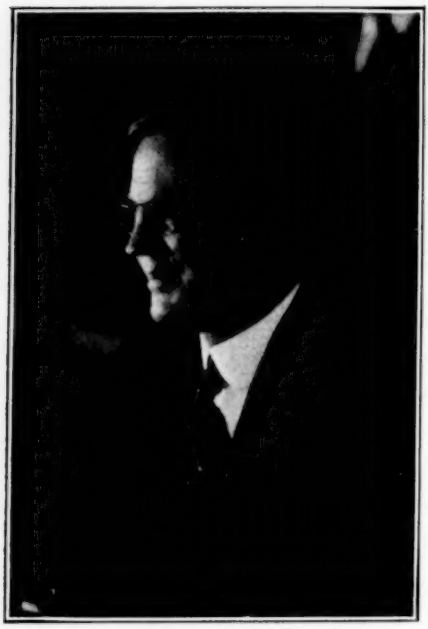
THE VETERINARIAN AND EXTENSION WORK

DR. HART'S paper in this number calls attention to a field in which the veterinarian can cultivate closer relations with the farmer to their mutual benefit and the public good. The so-called extension work carried on in every State with the State Agricultural College as a nucleus and with the coöperation of the National Department of Agriculture is being extended to include veterinary subjects. Furthermore extension veterinarians are now employed by other institutions and industries for the purpose of demonstrating improved or new lines of professional activity. Extension meetings are well worth the while of the busy practitioner, who may thus aid in the enlightenment of others, broaden his own knowledge, and at the same time stamp himself before the community as a progressive and public-spirited man of his profession. If the county agent occasionally steps over the line into the veterinarian's field there is no better way of adjusting this condition than by such friendly coöperation and conference as the extension work affords. If the veterinarian takes his proper part in behalf of general livestock sanitation there is less likelihood of others trespassing on his preserves.

J.R.M.

OUR NEW SECRETARY OF AGRICULTURE

THE SELECTION of Henry C. Wallace as Secretary of Agriculture in the Harding Cabinet meets with general satisfaction and favor on the part of the agricultural public. The new Secretary's career has been such as to fit him in a special way for the high position to which he has been called. As a graduate of Iowa State College, as Professor of Dairying in that College, as a practical farmer, as editor of *Wallaces' Farmer,* and as a leader in farm organizations, he has acquired a broad experience and an intimate knowledge of agriculture and its problems and needs. In his editorial policies he has emphasized the business side of farming and has been a strong champion of the farmers' interests. To his goodly heritage as the son of "Uncle Henry" Wallace he has added achievements in his own right in the agricultural and business world and a record of usefulness in civic and religious affairs.



HON. HENRY C. WALLACE,
Secretary of Agriculture

It is gratifying to know that in dealing with livestock matters Secretary Wallace will be on familiar ground. He has been a livestock breeder and for the past fifteen years has served as Secretary of the Corn Belt Meat Producers' Association. The new Secretary will face problems more serious than those of any of his predecessors but everyone interested in agriculture will find him easy to approach and absolutely conscientious in his consideration of their affairs. With the training and ability that he brings to his task, and with the support and good will of those whom he is to serve, there is every reason to look for a capable, progressive and successful administration of the National Department of Agriculture.

FEDERAL APPROPRIATIONS

AT THE SESSION of Congress just adjourned, the Bureau of Animal Industry, Department of Agriculture, has been provided with some additional funds with which to carry on its work during the fiscal year beginning July first next. The sum of $15,000 has been granted for making some much needed improvements and repairs to the animal quarantine stations situated at Littleton, Massachusetts, Athenia, New Jersey, and Baltimore, Maryland. In its work for the control and eradication of tuberculosis of animals, Congress has provided for the next year the sum of $1,978,000, an increase of $498,360 over the amount provided for the present year. However, Congress has deemed it wise to place a proviso in this item specifying that of this amount $1,000,000 shall be set aside for the payment of indemnities, leaving the sum of $978,000 for administrative and operating expenses. This limitation on the expenditure of the tuberculosis fund handicaps the work on this disease in that it does not permit the administrative officials to test as many animals as might be possible with the allotment of the entire sum left to the discretion of those officials, so that the greatest number of herds could be tested commensurate with the amount appropriated.

An additional sum of $50,000 has been provided for the dairy work of the Bureau with which it is hoped to carry on experiments and investigations in a more intensive way during the new year. The sum of $8,000 of the appropriation for animal husbandry work has been made immediately available in order to construct some necessary buildings on the sheep experiment farm in Clark County, Idaho, to furnish facilities for the investigation of problems pertaining to the sheep and wool industry on the farms and ranges of the Western States.

For investigating the disease of hog cholera and for its control and eradication, Congress has given the Bureau an additional sum of $93,280, making the total amount for the next year $285,480. There has also been provided the additional sum of $6,720 for carrying out the provisions of the Act of March 4, 1913, regulating the preparation, sale and shipment of viruses, serums, toxins, and analogous products for the treatment of domestic animals, making the amount for this project $195,000.

These two items will not only enable the Bureau to enter into the work of controlling hog cholera on a more intensive scale, but will aid the Bureau to supervise more thoroughly the manufacture of the biological products used in preventing losses from hog cholera and other diseases of animals, of which products the manufacture is constantly increasing, thus requiring more men to supervise their preparation.

In the other lines of work with which the Bureau is charged, the same amounts as during the present year have been provided with the exception of the appropriation for animal husbandry work which in its wisdom Congress has reduced by the sum of $20,000, leaving the amount for next year at $282,820; the item for tick eradication, which has been reduced by the sum of $21,160, making the amount for next year $660,000; and the item for the eradication of dourine, which has been reduced by the sum of $15,200, making the amount for next year $50,000.

While the Department recommended that the amount for carrying out the provisions of the meat inspection law should be increased by the sum of $309,020, in order that the Department might be able to meet the steady growth in this line of work, which involves both the ante-mortem and post-mortem inspection of animals slaughtered for food purposes and shipped in interstate commerce, the increase asked for was not allowed by Congress and approximately the same amount for next year, namely $891,180 in addition to the permanent annual appropriation of $3,000,000 was provided.

Notwithstanding the slight decreases in the amounts provided for some of the lines of operation, it is expected that the work of the Bureau during the coming year will be accomplished in the same efficient manner as it has been carried on in the past.

Agitation against anthrax infected shaving brushes has resulted in virtually paralyzing the Japanese bristle industry and that government is taking steps to open a national disinfection office at Kobe to remedy the situation.

Anthrax, a disease usually peculiar to cattle, has occurred in man through improperly sterilized brushes.

OUR PROFESSION [1]

By DAVID S. WHITE

President American Veterinary Medical Association, Columbus, Ohio

WHAT I wish to say to you today is in appreciation of the profession which you gentlemen have adopted as your own. I sometimes feel that too few veterinarians are proud enough of their profession. I think perhaps there is too much humility and too little pride. This feeling of humility is the child of ignorance and not of knowledge. No profession in this country has developed without a struggle. Whether it be law, medicine or theology, its place in civilization must be made through a long chain of deeds performed which are helpful to the civilization in which it exists.

Unlike the other professions, that of veterinary medicine was taken up in this country only within comparatively recent years. When our forefathers came across the seas and settled in New England they found a rugged country covered with a dense growth of forest. Out of the forest they were compelled to hew homes and farms in order that they might live. Land in those days might be had for the asking. The livestock interests were obviously nil. The few cattle, sheep and swine they possessed were branded and turned loose in the woods, where they multiplied much as in the natural state. Obviously under these conditions there was no particular need for veterinary service. In fact, in those days an able-bodied man who was neither a hewer of wood nor a drawer of water was more of a liability than an asset to the community. It was not until the post-stump stage of pioneer civilization that our ancestors felt rich enough to afford in a community an individual who did not toil with his hands as they.

Feeling the need of the spiritual first, a demand arose for ministers of the gospel; later for lawyers for the settlement of disputes, and then for trained physicians who could administer to them in sickness and in injury. It was not until the Indians had been driven back to the far West, towns and villages built and farm lands fenced, which caused the animal

[1] Presented recently at several state veterinary medical association meetings.

owners to keep their stock at home, that any demand arose for specially trained individuals to administer to the ills of animals as the physician did to man. In those early days, as the need developed, there arose in each community a self-appointed animal doctor. He was usually a man of no education, of little knowledge of veterinary art, and seldom equipped with more than a garrulous tongue and a keen desire to escape the drudgery of hard hand toil.

Following in his wake there came out from the old countries a few men trained in foreign veterinary schools, who usually settled in the larger towns, soon to enjoy lucrative horse practices. A few of these men, realizing that as the country grew in livestock population a demand for veterinary service would grow with it, turned their attention to the training of men to become veterinary doctors. While the earlier attempts were largely failures, a few of them did posses sufficient business acumen to create successful veterinary schools. Most notable of these pioneers were the late Andrew Smith of Toronto, Duncan McEachran of Montreal, and Alexander Liautard of New York. Each of these men founded a school. Obviously at this time the curriculum was brief and the entrance requirements the ability to pay the necessary fees. Later one of the great universities of the United States was prevailed upon by Huidekoper of Philadelphia to establish a veterinary department at the University of Pennsylvania. In the meantime some of the land-grant colleges, which had been teaching veterinary subjects to agricultural students, branched out in courses leading to veterinary degrees. Most notable of these were Cornell University, the Iowa State Agricultural College and the Ohio State University.

Following the pattern set by Smith, Liautard and McEachran, such men as Hughes, McKillip, both of Chicago, Gill of New York, Stewart of Kansas City, and others, each organized, in conjunction with their respective practices, veterinary schools. As the number of students attending these schools was large, the course of study confined largely to lectures given by resident practitioners, often with little or no compensation, and with no expensive laboratories to maintain, the experiment of educating veterinarians became a remunerative one. This led to the establishment of still more private schools, until in 1916 ten of them existed in the country.

Concerning the private schools much debate has always existed. Some members of the profession have been openly critical regarding their existence. However, this much must be said: They did supply the country with a great many good men, as among the hordes of students who attended them existed some excellent material. These men made good in the veterinary field, and largely through their efforts veterinary medicine in this country stands where it does today.

The State schools, generally speaking, began their work in the most primitive way. Usually an ambitious veterinarian, occupying the chair of veterinary medicine in a land-grant college, where he gave instruction to agricultural students, inaugurated a veterinary curriculum leading to a degree. While on paper the course of study looked alluring, in practice the teaching staff was hopelessly undermanned and the buildings and facilities for instruction were wholly inadequate. In the beginning few students were attracted to these schools. The support of the school came through legislative appropriations usually given as a lump sum to the land-grant college as a whole. The money was distributed by the authorities usually on the basis of the "greatest good to the greatest number." As the number of veterinary students was small, the veterinary school received but a scant share of the appropriations. Furthermore, "veterinary science" was looked upon not as a course of study embodying a large number of basic scientific and professional courses but as a single subject like physics or chemistry. This assumption on the part of the authorities naturally held back the development of the veterinary department.

It was not until the reorganization of the Bureau of Animal Industry, which created a sudden demand for a large number of veterinarians for food inspection and animal disease control, and the division of the western prairie ranches into small farms, creating a demand for veterinary service, that large numbers of young men entered the profession. This led to an overcrowding of many of the State-supported veterinary departments. The increase in student numbers had its influence when it came to a division of the appropriations. More men were added to the teaching staffs, buildings were erected, facilities and equipment greatly increased.

With the increase in student numbers, and the association

with teachers and students in the nonveterinary departments of the land-grant college, an influence was exerted to require higher entrance requirements in keeping with those demanded of students entering agriculture, engineering and other courses. This was done in order to procure a better type of students from the standpoint of general education. The impetus given increased entrance requirements originated in the State veterinary schools. Later one of the States by law required that all students entering veterinary schools in that State should be graduates of a high school or its academic equivalent. Obviously private schools were somewhat hostile to this proposition. They depended for their existence entirely upon student fees. To reduce the number of students, which higher entrance requirements would produce, was inimical to their interests.

Following the lead of the American Medical Association, the American Veterinary Medical Association, after a canvass of the situation, lent its influence to higher entrance requirements. This was followed by the Bureau of Animal Industry and by a few of the State examining boards. One result of requiring a higher general education of the veterinary matriculant has been to reduce greatly student numbers, especially in the more poorly equipped schools. Generally speaking, the better educated the matriculant the more discerning and demanding he is in regard to teachers, facilities and equipment. Today all of the veterinary schools of the United States and Canada require a minimum of four years of high-school training or its academic equivalent, and beginning with January, 1921, the same preliminary education is required of veterinarians who enter the service of the Bureau of Animal Industry. I do not mean to state that the reduction in the number of veterinary students in North America is entirely due to increased entrance requirements. There are other factors which undoubtedly bear upon this matter, but in our opinion the principal one is the higher educational qualification demanded of the matriculant at the present time.

The veterinary profession of the United States, despite its youth and its origin from an educational standpoint, has made a record to be proud of. No country in the world can boast of a mechanism so well organized and equipped to combat disease outbreaks as is afforded by our National Bureau

of Animal Industry. This Bureau has in its employ 4,673 persons, of whom 1,550 are veterinarians. While busy with hog-cholera control in 34 States, tuberculosis eradication in 43 States, tick eradication in 10 States, scabies, anthrax, dourine and stockyard inspection in 36 States, virus-serum control in 12 States, quarantine inspection in 9 States, and meat inspection in 46 States, it has found time to organize a plan of preparedness so well conceived that any invasion of any foreign communicable disease of animals may be combated with great assurance of success. Nowhere in the world have the veterinarians, under their own control, as large, inclusive and efficient an organization as our Bureau of Animal Industry. In my travels in other lands I noted the envy in which this organization was held by my foreign colleagues.

In most of the States there now exist fairly adequate systems of veterinary police. Unfortunately the efficiency of many of these organizations is subject to political interference. The appointment of a State Veterinarian, for instance, by the Governor is unfortunate. His office should be one of continuous administration. Changing each two years the policy of the State Veterinarian's office and the displacement of many of the technical employees of this office do not augur for the best interests of either the veterinary profession or the people of the State concerned.

A decided change for the better has occurred in the veterinary service of the United States Army since the close of the war. The National Defense Act of 1916, while it gave to the veterinarian the rank of a commissioned officer, was so loosely drawn, in so far as it applied to the veterinary service, that the status of the veterinarian was susceptible to more than one interpretation. It furthermore created no organization of the veterinary service and tended to crush rather than promote administrative ability in veterinary officers. The result was that when the United States entered the great war an entirely new, and for our people untried, system had to be inaugurated. In place of a small, well organized and equipped veterinary corps, which could form the nucleus of a larger organization in case of war, there existed only a handful of unorganized regimental officers just commissioned, though many of them had seen years of service, who could not take the initiative required to create an efficient veterinary service

for an army of four millions of men. This led to civilians of administrative experience being in many instances placed over the regular. That resentment should result from this unbusinesslike but necessary procedure is obvious. Largely through the influence of our National Association, Congress was prevailed upon to give the veterinarian a definite status in the Army and to accord him more adequate rank. While the Army Reorganization Act of 1919 falls far short of granting to the veterinarian full authority to do his own job, it is nevertheless a great step in advance and one which may from time to time be amended by subsequent legislation.

In addition to the veterinary schools and police organizations there have grown up in this country a large number of veterinary associations designed to uplift the profession. Most of these organizations are alive and progressive. A new profession, as is ours, is not afflicted with traditions which tend to hold it back. Therefore once an association begins showing signs of disease it is not long before its requiem is being sung. Our National Association, which now numbers approximately 5,000 members, is numerically the largest organization of its kind in the world. Its influence upon veterinary education has already been felt. Its policies and politics, however, have not yet fully been determined. Like many organizations of its type, it has been somewhat self-engrossed and more interested in its internal affairs and politics than it has in the good its organized effort could bring to the profession at large and to the public. However, it has outgrown its swaddling clothes, has thrown away its stick of candy and is rapidly developing into a red-blooded manhood, whose influence upon the profession and the public will be felt. As a matter of detail may be mentioned the desire of this association to procure for itself a permanent home from which its business may be transacted and its records securely housed, and the employment of a permanent Secretary whose sole business shall be the administration of its business. It takes time and brains to perfect an organization which is to be efficient. Like the farmer, the veterinarian has been difficult to organize. The majority of the rank and file are busy practitioners, each a little king in his own realm. He feels his independence perhaps too keenly, is too often self-satisfied and fails to recognize that sometimes by surrendering a part of his time, money and brain power

he can develop something which will later pay to him handsome returns on this investment.

I presume many of you here have been thinking about the future of the veterinary profession. Since the advent of the automobile vehicles a good deal of alarm has been created in the ranks of the profession. Some of us have hypnotized ourselves into believing that the profession is now, a derelict, a mere wreck on the beach. Admittedly the automotive vehicle has led to a reduction in the number and a change in the distribution of horses and mules. This has been felt particularly in the larger cities. Veterinarians who formerly enjoyed lucrative horse practices have found themselves bereft of an income derived almost entirely from the horse. While some of the more discerning ones were awake to the situation early enough to adapt themselves to the change, not a few surrendered to what seemed the inevitable and left the profession for other fields. On the other hand, small-animal practice in the cities has tremendously increased in the past 20 years. While 25 years ago one cage in the small-animal ward of the Ohio State University was ample to accommodate the occasional canine or feline patient, today we find 125 cages insufficient. Furthermore, the value of the average small animal patient is a sentimental one, thus placing it in a category more nearly approaching that of the human patient.

Since 1867 in the rural sections milch cows have increased from 8,349,000 at $29 each to 23,321,000 at $64 each in 1921. Other cattle increased in the same period from 11,731,000 at $16 each to 42,870,000 at $31.50 each; sheep from 39,385,000 at $2.50 per head to 45,067,000 at $6.50 per head; swine from 24,694,000 at $4 per head to 66,649,000 at $13 per head. These statistics show that all kinds of livestock have increased greatly in numbers and value since the Civil War, keeping pace with the increase in population. The only exception is the horse, which has actually decreased in numbers and fallen off in price. In 1867 there were 5,401,000 valued at $59 per head and 822,000 mules at $67 per head. In 1921 there were 20,183,000 valued at $82.50 per head and 4,999,000 mules at $116 per head. The curve for horses was upward from 1867 to 1893. It dropped from 1893 to 1901 when it arose till 1918. Since 1918 the number of horses decreased by 1,372,000 and fell off in value almost $22 per head. This was offset, however, in

the same period by an increase of 126,000 in the number of mules with a decline in price of only $13 per head.

The economic use of the automotive vehicle rests upon gasoline. Unless a substitute for this fuel can be found—and none has been found yet—eventually the price must go up until the economy of the motor truck haulage is seriously impaired. In countries where gasoline is high horse-drawn vehicles predominate. I found in France and Great Britain, outside of the military operations, an astounding predominance of horse haulage. I am informed by credible authority that during the year 1919 this country consumed all of the oil it produced, all it imported, and drew upon its reserve to the extent of 20 per cent. While since that time some progress has been made toward obtaining a greater gasoline output from oil and some new fields have been opened, this has been more than offset by the greater use of motor cars. In its final analysis, whether the horse or the motor truck predominates will depend upon which of the two types of engine is the more economical. Personally I do not believe any of us will see the time when, as predicted by some, the horse will become as great a curiosity as the giraffe or other rare circus animal. For the horse of proper type of the heavier breeds there is an excellent future. Today for each colt born in the United States three adult horses are taken from the supply and put to work. In the last decade no marked improvement has been made in the automotive vehicle. The Ford of 1910 in motor and chassis design is very much like its 1920 descendants. No radical departure from this design seems contemplated. Farmers are finding the tractor a valuable supplement to the horse on farms adapted to its use. On the other hand, it has been found that even where the tractor can be used economically from other standpoints it rarely displaces enough horses to "pay for its keep."

Admitting that the veterinary profession is now in a transitional stage, endeavoring to adjust itself to new conditions made complex by the fact that we are in the wake of a great war, when we realize what the profession has done for the people of the country in the past we must assume that its task is by no means finished and that we really stand on the brink of still greater opportunities. The livestock industry of the United States represents an investment of approximately ten billions of dollars. Annually three hundred millions of

dollars are lost to this industry through animal disease. As the population increases the problem of feeding the masses grows ever greater. To meet this problem a more intensified type of agriculture must be undertaken. While in the early days thousands upon thousands of cattle roamed the unfenced ranges of the West and the cost of producing beef was a minimum one, with the fencing of the open ranges and their division into smaller farms, coupled with the introduction of irrigation, land values have so greatly increased that the old method of raising cattle has been abandoned. The production of beef on high-priced land is a much more expensive proposition which adds greatly to the value of each animal produced. What applies to cattle applies equally well to horses, sheep, swine and poultry. In the future we may look for a greater production of better bred animals and higher priced ones, for under

STUDENT POPULATION OF VETERINARY COLLEGES, 1920-21

NAME OF INSTITUTION	FIRST YEAR	SECOND YEAR	THIRD YEAR	FOURTH YEAR	SPECIAL	TOTAL
State Colleges						
Alabama Polytechnic Institute	20	15	12	6		53
Colorado Agricultural College	26	22	20	20		88
Georgia State Agricultural College	7	7	3	4		21
Iowa State Agricultural College	30	24	18	22		94
Kansas State Agricultural College	9	20	13	18	1	61
Michigan Agricultural College	1	8	4	8		21
New York State Veterinary College (Cornell)	13	32	15	16	2	78
New York State Veterinary College (N. Y. Univ.)	7	3	5	8		23
Ohio State University	19	30	30	25		104
Ontario Veterinary College (Toronto, Canada)	24	32	22	17		95
University of Pennsylvania	4	8	7	11		30
Texas Agricultural and Mechanical College	1	5	2	6	4	18
State College of Washington	3	1	6	12		22
Total, State Colleges	164					708
Private Colleges						
Indiana Veterinary College	11	28	23	73	1	136
St. Joseph Veterinary College	10	38	16	37		100
Total, State and Private Colleges	185					944

a system of intensive agriculture only those animals will be retained which pay for their keep. The veterinarian of the future, in my opinion, will find veterinary practice, which now includes all domesticated animals, even poultry, more stable in its remuneration than ever before.

In this connection, and as evidence that this view is not shared by the masses, permit me to draw your attention to the student population of the veterinary schools of North America.

The tabulation shows that 944 students matriculated in the fall of 1920 in the fifteen veterinary schools, including two private institutions, one of which is no longer accredited by the A. V. M. A. Of these 185 were freshmen. There were 3,160 veterinary students in North America in 1916.

While, as noted, the higher entrance requirements are probably the principal factor in producing this marked decline in attendance, undoubtedly there are other factors. Briefly, some of them are the complaints of once prosperous veterinarians who have lost their city horse practices, the low salaries paid the veterinarians in the Bureau of Animal Industry, the poverty of many municipalities which have outgrown their ability to raise enough taxes to support themselves adequately, the swollen wages of today, and the popular belief that since the production of automotive vehicles there is no further need for the veterinarian.

As a remedy for this condition some have advised that the entrance requirements to the profession be lowered, again throwing open its portals to anyone rejected by medicine, law or dentistry. It is an old saying that "a silk purse can not be made out of a sow's ear." We are already far enough behind the entrance requirements of the other professions. I do not believe that we can make progress by walking backwards. In the final outcome the matter will adjust itself. If for the next few years the number entering the profession is too small to meet the demand, the public will recognize this fact, and again we will find the halls of our veterinary institutions of learning filled.

There has been a notable increase in the number of veterinary students in France and Germany. The figures are: Alfort, 222; Lyons, 154; Toulouse, 167; Berlin, 410; Hanover, 575; Dresden, 269; Giessen, 202; Munich, 243. The requirements

for admission to a veterinary school on the Continent are practically equivalent to two years of arts college work in this country.

We believe a partial solution of the problem is to strengthen our schools by greater appropriations to procure better teachers and more adequate facilities and equipment. The livestock owners of the United States will demand that some group of men minister to the sick and injured animals which they possess and advise them against anything which is a menace to these animals in health. If the veterinary profession is not competent to do the job some other group of persons will and must. But I do not believe that as a profession we are willing to quit the job. Our past achievements are known to the wide-awake livestock man. He is our best friend and counsellor.

When we think of the great animal plagues which our profession has either kept out of the country or controlled or eradicated once they got in, we have much to be proud of. Rinderpest has never visited us. Sheep pox has never existed among us. Surra has been kept out. Despite its remarkable versatility in its effort to gain a foothold on the American Continent, that dreaded immigrant foot-and-mouth disease has each time been accorded such an inhospitable reception that its future under the American flag seems very dark. Those of you who remember the last epizoötic of this plague know well the trials and tribulations of our profession in its effort to perform its duty. With Congress, State Legislatures, Governors, and influential citizens, some of them members of our own profession, on our backs, in the language of football the veterinary line "held." While for a time they were on our two-yard line and bucking hard, nevertheless we held for "downs," the ball was passed over and we punted out of danger. With the disease in 22 States, covering an enormous territory, greater than that of all Europe and Great Britain combined, the veterinary profession forced the plague to evacuate our shores.

With Southern cattle fever, despite much opposition, the veterinary profession continues to crowd southward the quarantine line extending from the Atlantic to the Pacific. It needs no great stretch of imagination to see the last of the cattle ticks drowned in the Gulf of Mexico.

After much misrepresentation the use of tuberculin as the

most important factor in the eradication of tuberculosis of cattle has been generally accepted by the public. The great white plague is gradually receding, and while in our time it may never be entirely wiped out we may look forward with confidence to a system of control which will cause it to become negligible.

Hog cholera we now know how to control. Through the discriminate and skilful use of serum-virus on healthy herds hog cholera has ceased to be a problem from a veterinary standpoint. Once the public is educated to the point of coöperation this disease will join the "used-to-have-its."

With glanders, rabies, dourine and the various skin diseases caused by mites, veterinary control is becoming yearly more manifest.

The most serious problem, and the one against which we have made the least progress, is the abortion disease of cattle. But of this we do not despair. Our history shows that we have in time licked every plague which confronted us. We are of the firm belief that history will repeat itself in this regard.

All our profession needs today is to await the development of more men of the best type. Some of these are already decorated with a veterinary degree but still young and awaiting the golden opportunity to make a place for themselves in the profession. Some are in the schools; others will enter the profession once they realize its importance to the Nation and the service which they, through it, can render to mankind.

No veterinarian who has knowledge of the accomplishments of his profession need feel the sting of humiliation. Rather should he feel the inspiration of a pride, the product of a devotion to a duty well performed. Whether it be in the field of practice, in National, State or municipal veterinary police work, in research, in teaching or in the Army, experience has taught us that once given the authority to do his own job the veterinarian has always made good.

It should be part of the business of every veterinarian to create about him an atmosphere of optimism concerning his profession. He should affiliate himself with local, State and National associations and do so with more of the spirit of what he can put into these things than what he can get out of them. Shortsightedness has brought too many of us to professional

ruin. Farsightedness is the keynote of professional success. Let us as a profession present a united front. Let the slogan be "Less knocking, more boosting." Numerically we are the smallest of the learned professions. We can not therefore afford to allow our house to became divided against itself. Our greatest asset is our knowledge of things of which other men know little or nothing. Without bombast or brag let the people know what our mission is and that we are prepared to carry it into effect. In Biblical language, "Let your light so shine before men that they may see your good works."

STOCK PAPER TO VETERINARIANS.

A well known breeder of purebred beef cattle recently subscribed for a leading livestock periodical for a veterinarian of his acquaintance, and gives the following reason which offers a valuable hint to all veterinarians:

"Today the veterinarian to whom I am asking to have the paper sent and who stands high in his profession, was looking over the cattle bought by —— —— in the —— and —— sales, some $18,000 worth. He did not know the breeding of them and it occurred to me that if the veterinarians of our country had an opportunity to post themselves on purebred cattle, they could add much to their success and popularity when making calls."

VETERINARY PRACTICE AS IS.

Recently a veterinarian practicing in one of Pennsylvania's mining towns was handed the following note by a five-year-old boy of foreign birth:

"they are 3 months old weigh 35 lbs.

"they run to the closet all the time and they wount eat nothing and there ears get red like blood and would you give this boy something for them."

Being somewhat puzzled, the Doctor questioned the boy and received the somewhat surprising answer: "Pigs, mister, pigs—you know pigs." —R. M. S.

THE PRACTITIONER'S RELATION TO STATE MEDICINE [1]

By JOHN R. MOHLER, *Washington, D. C.*

SIX YEARS AGO war was precipitated upon a startled world and swept from country to country like a great tornado. Civilization trembled under the menace of militarism in its most oppressive form. Thrones were overturned, republics were born in a day, chaos prevailed everywhere in the Old World, and it seemed that democracy was doomed to destruction, when the United States entered the conflict and with the might of its powerful resources and the valor of its Army and Navy turned impending defeat into victory. The best of our manhood from all walks of life responded eagerly to the call to colors, but none more willingly or more gallantly than the members of the veterinary profession. Never before in the history of our country had the profession enjoyed such an opportunity of justifying its existence. The triumphs achieved by the profession at the front through effective organization and direction and the display of surgical and medical skill justify the recognition that has been accorded to the members of the profession who entered the military service.

We heard much about the demands made by war upon the endurance of munition workers, ship builders and coal miners, but those of us who were in position best to know do not hesitate to assert that no group of manual laborers was exposed to a strain greater than that which practitioners and official veterinarians had to bear, and there was no slackness in their efforts to stimulate production, to encourage conservation and to increase and protect the food supply of the Nation. The country was inclined too much to take for granted services which I do not scruple to call the heroism with which that emergency was met by those who were obliged to stay at home. We may justly feel proud of the record of the veterinary profession throughout the war, and the accomplishments during that period indicate the potential possibilities of its efforts in the control and eradication of our animal diseases when organized and working with a unity of purpose under proper and efficient direction.

[1] Presented at the Thirteenth Annual Conference of Veterinarians, Cornell University, Ithaca, N. Y., January 20-21, 1921.

We rendered material assistance in speedily conquering the enemies of civilization on the battlefield, but we are yet confronted with our old invisible foes, numbering countless myriads, lurking in cracks and crevices, launching their insidious attacks from dark, damp, dirty places, and which for years and years have been devastating our herds and flocks and also collecting indemnities in human lives.

The thought is naturally aroused that if the powers, the fighting forces of the veterinary profession, could be directed against communicable animal diseases with the same zeal and unity of purpose as they displayed in performing their part in the conquest of the hosts of the Kaiser, we could make wonderful progress within a relatively few years in exterminating such diseases as tuberculosis, hog cholera, splenetic fever and similar plagues.

The facts are that State medicine has never been developed and organized as it should be. State regulatory authorities have not been prompted nor permitted by public sentiment to put forth the efforts of which they are capable in animal disease control, and neither they nor the National authorities have been supplied with sufficient funds to utilize to the best advantage the resources of the profession except in the campaigns against contagious pleuro-pneumonia and foot-and-mouth disease.

RESPONSIBILITIES OF THE PROFESSION

The veterinary profession is the main guard of our ten-billion-dollar livestock industry—the greatest income-producing property in the United States, and I believe as a whole it stands ready to increase its efforts in protecting this industry from the ravages of disease if given the opportunity. The number of veterinarians engaged in State medicine are but a handful compared with the thousands of practitioners who for the most part are conducting their battles single-handed under present methods.

In addition to their numerical strength, veterinary practitioners are engaged in a work which places them in a position of especial and peculiar responsibility to the community and to the State and National livestock sanitary authorities, a work which carries with it moral and, usually, statutory obligations. The State requirements in regard to examination, registration and license for those desiring to practice veterinary medicine are a partial recognition of this, and presumably such licenses

are given on the assumption that the recipients will fulfill their obligations. Upon the proper fulfillment of these duties and responsibilities depends to a great degree the ability of the authorized State and National regulatory bodies efficiently to perform their functions.

The livestock owner reposes confidence in the ability and integrity of the practitioner who is approved by the State, and relies on him for attention and skill, the lack of which may mean loss financially and may indirectly affect the health of the stock owner's family. The practitioner, through daily contact with livestock men, is in a position to render much valuable service to State and National officials as well as to his clients by disseminating correct information relative to the diseases of animals, in helping to mold public sentiment in regard to the approved methods adopted for controlling disease, and in directing public action into proper channels for the public welfare. Notwithstanding the advances made by science, there is yet much ignorance among the laity. In many sections even the danger to human beings from contagious animal diseases is not generally understood by the people. This is true especially of tuberculosis, rabies, glanders and anthrax. They know little about the parasites that are transmissible from animals to man, and there is need for enlightening livestock growers in regard to prophylaxis including sanitation, and such animal husbandry subjects as feeds and feeding and the principles of breeding.

Much of the opposition of stock owners and the public to State medicine in enforcing essential livestock sanitary measures is due to a lack of knowledge as to the nature of the diseases, their harmfulness, how they are disseminated, and the steps which science and experience have shown to be necessary in successfully combating them. Usually ignorance is responsible for the opposition met, but sometimes this opposition is perpetuated, if not originated, by prejudiced or covetous individuals, or those who assume positions too radical, though perhaps theoretically correct.

PRACTITIONERS ON THE PICKET LINE

The practitioner by the nature of his vocation is brought into intimate contact with the misfortunes of his clients; he is the one who is best able to tell us where hog cholera has ap-

peared; he can lead us to the pasture where the spores of anthrax may be found; he can tell us which herds are healthy, and can point out the individuals in other herds which harbor infection. He is the first to know when and where pestilences appear, and, most likely, first to learn their source.

Veterinary practitioners constitute the picket line of livestock health organizations; they are the sentinels who are in a position to give the first alarm at the presence of disease; they constitute the greatest trained fighting force available—the backbone of animal disease control work. The backbone is the most important part of the skeletal frame, but every backbone is surmounted by a cranium from which the movements of all parts of the body are coördinated and controlled. Every institution and every movement of importance in finance, commerce, moral uplift or disease control must have a responsible directing head. Individual effort, no matter how skillfully it may be applied, is limited in its power to accomplish the greatest possible results, both by lack of authority and by restriction of the field of activity. The livestock sanitary board or its equivalent is the logical directing head of organized activities in suppressing animal disease within the State, and, under our form of government, the State regulatory authorities and the State laws are supreme within the State boundaries. The National authorities have no power to undertake any animal disease work within a State except with the consent of the State, and then it is conducted under State laws in coöperation with the State authorities. It is right and proper that States and their communities should continue to assume and exercise their local duties and responsibilities in suppressing diseases within their domain and not come to depend too much upon National assistance. The National Government, however, becomes interested whenever a communicable disease appears in a State, as one of its functions is to protect other States from its spread through interstate channels. In order to accomplish this most expeditiously and effectively, where States need assistance, it is frequently desirable to extend coöperation to them in suppressing outbreaks. The activities of both the State and National authorities and those in active association in the prevention and control of disease constitute State medicine, or, in other words, organized action in combating disease.

EXPANSION OF STATE MEDICINE

I shall not attempt to forecast the precise advance in State medicine, but who can doubt that, as the years go by, veterinarians, as well as our brothers in the medical profession, will become engaged more and more in State medicine. The Nation is manifestly evolving in the direction of State service. We have but to view the trend in human medicine to become convinced of this. At present a considerable proportion of the medical practitioners are engaged in some form of communal service, as, for instance, insurance and poor-law practice, public vaccinators, medical officers of health, tuberculosis and venereal disease activities, school medicine service, lunacy and factory service, etc., and the large number connected with the Army and the Navy and the United States Public Health Service. Some have even suggested that compulsory health insurance should be extended to all classes of the community. We probably are not within measurable distance of that consummation, but it is self-evident that the claims of the body politic upon State medicine in this and other countries will inevitably expand, and it may be expected that veterinary practice will, to a limited degree, follow the advances in human medicine.

BENEFIT TO PRACTITIONERS

Livestock owners, through their rapidly developing organizations, are increasing their demands on veterinary State medicine for protection. There is a tendency toward specialization in certain lines of practice, and already a number of farm bureaus and counties are employing veterinarians on yearly salaries to protect their interests. Some veterinary practitioners do not regard these changes with enthusiasm or even equanimity. I do not view with serious apprehension for the practitioner the prospects of this natural trend of veterinary medicine. Any advances made thus far in this direction in veterinary medicine have resulted in increasing the opportunities of the practitioner. At various times in the history of State medicine there has been a manifest feeling on the part of some practitioners that they were not included sufficiently in the scheme of operation, that they were separate and apart from the coöperating National and State authorities, and that they were not only slighted but their interests were disregarded and jeopardized.

The first echoes of this nature were heard in 1884 when the Bureau of Animal Industry was established. It immediately turned its attention to assisting the States in eradicating contagious pleuro-pneumonia. Again in 1902 when foot-and-mouth disease appeared in New England, some practitioners opposed the policy of slaughtering the diseased and exposed animals on the ground that their practices would be curtailed and probably ruined.

In spite of the efforts of practitioners and the State authorities with their limited funds and facilities, sheep scab spread in the United States until the infected area included all of the territory west of the Mississippi and several States to the east, comprising an area of about 1,800,000 square miles. In 1903 the Bureau quarantined the infected area and began actively to coöperate with the States to eradicate the disease. At the time this work was begun scabies was so prevalent and the losses from the disease were so great that many stockmen gave up sheep raising and others were deterred from entering the business. With the elimination of scabies the sheep industry made unprecedented progress, to the advantage of the practitioner.

In 1906, when tick eradication was first undertaken, some practitioners in the South protested against the invasion of their territory by Bureau and State veterinarians. This opposition vanished rapidly when they came to realize that tick eradication meant the transformation of the South into a great livestock and dairy country.

The inauguration of the hog-cholera work in 1913, to establish confidence in the reliability of potent anti-hog-cholera serum when properly administered, met an unwelcome reception from many veterinary practitioners. Vigorous protests were made against placing Bureau and State veterinarians in the field to conduct gratuitous demonstrations, on the ground that this service was robbing them of their means of livelihood. The Bureau held steadily to its purpose, and the desired results were rapidly obtained. The increase in the use of serum resulted in an expansion of the swine industry, and when, last July, it became necessary to reduce the Bureau field force on account of a reduction of the appropriation, more letters requesting a continuation of hog cholera control work were received from veterinary practitioners than from any other source, as they had

come to consider the official veterinarians as a distinct asset to them.

It may be said to the credit of the profession that notwithstanding the limited opposition mentioned, veterinary practitioners, generally, gave valuable assistance to State and National authorities in the successful prosecution of these various projects.

TUBERCULOSIS ERADICATION AND THE PRACTITIONER

The control of tuberculosis is one of the most important problems now confronting the veterinary profession. We can point with pride to the creditable accomplishments of the veterinary profession in the field of scientific research, which have thrown light on the nature of this disease and the methods that must be employed effectually to suppress it. But we have been tardy in systematically applying the acquired knowledge. Although practitioners have been using the tuberculin test in this country ever since 1892 and some States have attempted at different times to control animal tuberculosis, the disease has continued steadily to spread and increase until it has become a menace to our livestock industry and human health. It is now a National economic problem of vital importance. The livestock industry is looking to the veterinary profession and expects more effective results in handling this problem than have been accomplished in the past. With that object in view we are now engaged in a campaign against tuberculosis. It could scarcely be expected that any method of procedure that is very promising of success would meet with universal approval by all concerned. The successful eradication of contagious human or animal disease necessarily involves some inconvenience and sacrifice, more or less transitory, on the part of all concerned.

On December 4, 1917, the United States Live Stock Sanitary Association and representatives of purebred cattle breeders' associations unanimously adopted the plan now in operation, known as the accredited herd plan. Later the plan was submitted to the Bureau for consideration, and it was approved December 23, 1917. The work in the field had been inaugurated on a somewhat elaborate scale in May, 1917, in coöperation with the States, under an appropriation made by Congress at the solicitation of the livestock interests of the country. One of

the provisions of the plan formulated by the joint committee composed of representatives of the United States Live Stock Sanitary Association and the breeders' associations was that the tests shall be made "under the supervision of the Bureau of Animal Industry, or a regularly employed veterinary inspector of the State in which the coöperative tuberculosis eradication work is being conducted." This provision brought forth critical comment from some practitioners, similar to the objections brought forth when the Bureau first began to coöperate with the States in the suppression of contagious pleuro-pneumonia, foot-and-mouth disease, hog cholera, and Texas fever. Probably had due consideration been given to future prospects, this provision of the accredited herd plan would not have been viewed by any practitioners with grave apprehension.

From the beginning it was believed that breeders would be eager to take advantage of the opportunity to have their herds freed from tuberculosis and accredited, and that a popular sentiment would be created and develop in favor of eliminating tuberculosis not only from breeding herds but also from dairy herds and circumscribed areas. As a matter of fact, the accredited herd work is developing along the lines anticipated. With the limited funds, even now it is not possible to keep up with the demands for advance work, and accredited herds are rapidly accumulating which must be tested yearly to keep them on the accredited list. Urgent requests for assistance in circumscribed area work are increasing in number, city boards of health are turning their attention more and more to the subject of tuberculosis in connection with their milk supply, and our export trade in breeding stock which must be tuberculin tested is growing rapidly.

When the accredited herd plan was approved by the Bureau it was realized that in order to work out successfully it must have the support and coöperation of all interested and especially the assistance of veterinary practitioners. Regulation 7, which permits recognized graduates to do interstate testing when approved by the State, was prepared in a manner to relieve those regularly engaged in accredited herd work from making tests for interstate movements, and in published and written statements the Bureau has advocated the desirability of practitioners testing herds wherever possible preliminary to turn-

ing them over to the Bureau and State authorities for accrediting according to the adopted plan.

As early as December, 1918, it was recommended that fully accredited herds be placed under the supervision of approved practitioners who should administer the yearly tests to keep them on the accredited list. At the same time it was recommended that as many practitioners as possible be employed in circumscribed area work in order to advance it rapidly. It seems that most of the criticism from veterinary sources was not well founded and was rather premature. The work has been in operation only since May, 1917, and the reports indicate that in various sections of the country the veterinary practitioner is already participating in the benefits from the campaign to control tuberculosis.

At a meeting of the State Veterinary Association of Tennessee the 80 members present were asked what effect the accredited herd work was having on their practices. Several replied that it had already proved of benefit financially. Most of them had experienced no difference and none claimed that it had injured them.

Several months ago the Minnesota veterinary officials expressed the opinion that private testing had increased in that State about 55 per cent since the coöperative accredited herd work was inaugurated. Dr. C. H. Case of Akron, Ohio, read a paper at the meeting of the United States Live Stock Sanitary Association, November 29, in which he stated that the accredited herd was proving of benefit to the private practitioners of his State. It was reported at the last annual meeting of the Michigan Veterinary Medical Association that private testing had increased approximately 50 per cent in Michigan since the inauguration of the accredited herd work in that State.

The following is quoted from an article by Dr. W. W. Emmel, an Iowa practitioner, which appeared in the December, 1920, issue of *Veterinary Medicine*:

> **When the present campaign against bovine tuberculosis was inaugurated by the Federal Government in coöperation with the various States, it was the consensus of opinion among practicing veterinarians that their business, so far as the conducting of tuberculin tests was concerned, was "shot." The eradication of tuberculosis under the Federal accredited herd plan has been in operation in Iowa for a little more than a year. Some statistics recently com-**

piled for the past fiscal year for comparison with the preceding one will no doubt prove of interest to every member of the veterinary profession.

Fiscal year ending July 1, 1919

Animals tested	*Kind of test*	*Per cent reactors*
6,057	Private	3.7
1,207	State	4.

Fiscal year ending July 1, 1920

25,458	Federal coöperative test	5.9
12,000	Private	4.2
4,960	State	5.1

N. B.—Private tests on animals intended for interstate shipment not included in either case.

From the statistics above it will be noted that the number of animals tested on private test has doubled since the Federal accredited herd plan was put into effect in Iowa. State tests have increased to a great extent also, due probably to the fact that owners now receive reimbursement from the State on condemned animals. As a provision to protect the practicing veterinarian, State tests are not conducted on animals intended for sale, nor on premises except where tuberculosis is suspected to exist, and then when the premises are clean it is up to the owner with the aid of the practicing veterinarian to use reasonable precautions to see that they remain so.

One might attach some significance to the fact that the percentage of reactors on private tests have increased five-tenths per cent since the inauguration of the accredited herd plan. Expressed in the words of one practitioner, he has "the backbone to find reactors" now. The owner wants to get rid of his reactors now, whereas formerly there was a tendency for him to want to "get by."

The accredited herd plan in Iowa has done much to educate the stockman as to the real character of tuberculosis and the many times visible economic loss which the disease produces.

This has resulted in a marked increase in the number of animals tested by the practicing veterinarian during the past year.

That there has been an increase in private testing since the accredited herd plan has been in operation is also indicated by an increase of over 300 per cent in the production of tuberculin by private concerns. The records of the Bureau show the production for the years 1917, 1918 and 1919 as follows:

Year	Cubic centimeters	Discs
1917	918,340	1,800
1918	786,567	6,535
1919	2,280,490	5,980

During the fiscal year 1920 (July 1, 1919, to June 30, 1920) there were produced 2,761,406 c.c. and 51,735 discs.

In considering the volume of tuberculin produced we must not lose sight of the fact that the intradermic method has been used to a considerable extent during the past two years. This

means that many more cattle are being tested with each 100 c.c. of intradermic tuberculin than with a like quantity of the subcutaneous product.

The veterinary practitioner stands in an important relation to the National and State coöperative organization in carrying out the accredited herd plan. As the plan progresses it is expected that his scope of activities will broaden and he will be asked to assume increased responsibilities. Already there are over 5,000 herds on the accredited list, and approximately 27,000 more are in process of accrediting. In all probability State and National appropriations will never be sufficient to employ enough regularly employed veterinarians to more than blaze the trail in eliminating tuberculosis from our 60 million bovine and 73 million porcine population.

The campaign now being waged against animal tuberculosis is growing continuously in intensity and interest. Only a few months ago a resolution was adopted at a meeting of the representatives of New York State farm bureaus in Ithaca, providing that every county in the State should coöperate with the State and Federal authorities in the eradication of tuberculosis.

The Holstein-Friesian Association at its recent annual meeting adopted a resolution providing that after a certain date no purebred cattle or any other cattle could be entered for any sale held under the auspices of that association unless they came out of a herd under State and Federal supervision for the eradication of tuberculosis.

The New York State Dairymen's Association held a meeting recently at Watertown, N. Y. A prominent feature of this meeting was the very strong sentiment expressed in favor of the elimination of tuberculosis from all herds in the State, so as to establish in the minds of prospective purchasers from other States confidence that they could secure in the State of New York cattle of the highest degree of merit for productivity and free from tuberculosis.

The accredited herd work now being carried on in the State of New York is highly complimentary to the progressive support of the livestock industry and the State Bureau of Animal Industry, and the important relation of the veterinary practitioner to State medicine in the prosecution of this project is deeply appreciated by the coöperating agencies.

VETERINARY TRAINING FROM THE STATE BOARD STANDPOINT [1]

By C. W. FOGLE, *Leipsic, Ohio*

AS A MEMBER of an examining board I was delighted when the American Veterinary Medical Association and the Bureau of Animal Industry made the rule requiring a high-school education for matriculation. I am a graduate of a private school; nevertheless I am not now, nor ever have been, an admirer of the methods of some schools. The blame for 75 per cent of those failing to pass the State examination should be laid at the door of certain unscrupulous schools. They cater to students who are not intellectually qualified ever to become veterinarians, and they do nothing to improve these students, but relieve them of their money and take several years of their time which might otherwise be of some benefit to society.

We tried to get certain educational requirements stated plainly in our present veterinary practice law which was enacted in 1915, but failed on account of certain private interests in this State. We were striving to make a four-year high-school course necessary for matriculation, and a four-year college course of nine months to the term compulsory, before a student could take the examination.

As we all know, a high school acts as a sieve; the more undesirable students, that either can not learn or will not study, drop out. Then honest administration in the first two semesters of college weeds out the misfits—men that would make better enginers or preachers, or what not, than veterinarians. Our experience is that most failures are due to the lack of the above-mentioned sorting process, for you get some excellent students from some very bad schools and some quite poor ones from the best colleges.

Here are some examples of men who never could pass an examination, no matter who their teachers might be:

Question: Give the attachments of the masseter muscle.

Answer: The origin of the masseter, it attaches to the head of the femur and to the tibia. Its action is to flex the stifle joint.

[1] Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.

Question: Give the boundaries of the inguinal canal.

Answer: The inguinal canal is located in the abdominal cavity. Its boundaries are the stomach, intestines, liver and kidney.

I would say that a man would have to be some circus performer to castrate a cryptorchid with such an inguinal canal.

Question: Name four ductless glands.

Answer: The ductless glands are Steno's duct, Wharton's duct, Rivinus's and Bremer's duct.

Question: Give the dentition table for an ox.

Answer: At about four to six months.

Question: Give the full dentition table for a horse.

Answer: The horse gets his middle teeth at one year, lateral at two years, corners at three years, and a full mouth at five years.

This man had been in practice seven years. I kidded him, asking how the colt would live without teeth until one year old. He became indignant, saying that the colt was born with all of his temporary teeth. Then I asked what he meant by a full mouth at five, when the corners come through at three, and he said he got his tusks at five.

I could burden you for an hour with ridiculous answers out of a list of only twenty-five papers from the last examination, for, after writing this paper, I found some worse than the illustrations that I have given.

These students are misfits. They should never have been permitted to pass the examination at the end of the first semester. The fact that they have been given diplomas, and the buck passed to the State Examining Board, shows how unscrupulous and mercenary are the faculties of the colleges from which they were graduated.

On the other hand, the graduates of some of the best schools show, by their papers, that their education has not been thorough enough in some of the basic subjects which they studied in the second and third year. Some are woefully deficient in common sense and knowledge of common law taught in jurisprudence. They have a tendency to use a conglomeration of words which mean nothing. They try to use the proper anatomical names and do not know how; when it would be much better, if in simple, plain English, they would indicate some knowledge of the subject.

I do think that one thing which should be taught to all students is to express their ideas in a simple and concise manner. It is a trait that is worth far more in daily life. An examiner can worry through four pages of meaningless pseudo-scientific words, when one-half page would fully answer the question. But several poor farmers will have to listen to this foolishness every day of every year so long as this man stays in practice.

It is a grave error to have so many recent graduates on the teaching force, men who have never actually made a dollar at the profession which they are trying to teach to others; men who are deficient in knowledge of the actual conditions that will be met with on the farm. Just imagine how popular a veterinarian would be who washed, disinfected and painted with iodine a pig before castration. And yet I had a student who thought that such a procedure was proper and necessary.

It is a mistake for every other State to try to have a veterinary department tacked on to its State University or Agricultural College. The States that now have good schools should be encouraged to make them better. The whole profession should help in the matter of securing sufficient funds for these few good schools. Let the weak ones drop.

The Rockefeller Foundation has recommended that in all lines of education certain schools should specialize in certain courses of study, thereby doing away with so much useless duplication of energy and expense. It can well be applied to veterinary medicine.

A NATURAL CONCLUSION

Harkins, who had taken his children to a country place during the holidays, was proceeding across the field with Louis, the youngest, when the latter saw a cow for the first time.

"What is that?" asked the child.

"That's a cow, my son."

"And what are those things on her head?"

"Horns."

And the two then moved on. Presently the cow mooed, whereat Louis was surprised.

"Which horn did she blow, father?" he asked.—*Harper's Magazine.*

PROGRESS OF TUBERCULOSIS ERADICATION IN PENNSYLVANIA [1]

By SAMUEL E. BRUNER

Bureau of Animal Industry, Harrisburg, Pennsylvania

THERE ARE approximately 1,000,000 dairy and breeding cattle on 202,298 farms in Pennsylvania. On a basis covering the number of infected herds found as the result of the first herd test, which is 40 per cent, 9 per cent of all the cattle tested are condemned as the result of the first test. There are on 85,000 of the 202,298 farms approximately 100,000 tuberculous animals in Pennsylvania today.

Consider for a moment that we have under supervision only 3 per cent of the cattle in the State, you will have some idea as to the extent of the work that remains to be accomplished in order to have a tuberculosis-free State. The problem is a large one. It is gratifying to know that the disease can not only be controlled, but actually eradicated from infected herds in a comparatively short time. While everyone connected with the work is optimistic concerning the future, yet you realize the tremendous task to be performed in order that the disease will be completely eradicated in Pennsylvania.

With the results that have been obtained covering herds that have been and are now under the direct and indirect supervision of the Pennsylvania B. A. I., and especially those herds under the accredited plan, we have sufficient information to state that tuberculosis can be eradicated from infected herds, and once freed they will remain as such.

To further justify this statement, refer to Table 1:

TABLE 1.—ACCREDITED PLAN, APRIL 1, 1918, TO JANUARY 1, 1921

104	of 115 herds tested 1918, accredited
424	herds accredited
527	herds credited one successful test
73	accredited herds retested and certificates renewed

This table needs very little explanation. From a number of the herds as indicated, before they became accredited with one successful test, or those fully accredited, tuberculous animals

[1] Presented at the annual meeting of the Pennsylvania State Veterinary Medical Association, Harrisburg, Pa., January, 1921.

were removed. Of the 46 States coöperating with the Federal Bureau in the establishment of tuberculosis-free herds under the accredited plan, Pennsylvania stands third as to the number of accredited herds. It is to be expected that an occasional accredited herd, when retested, will reveal tuberculous animals. Recently the Federal Bureau announced that 74 of more than 4,000 accredited herds when retested were found infected and certificates revoked. The chances are that it will happen in Pennsylvania; but of the entire number of accredited herds retested in Pennsylvania, the entire group, 73 herds as indicated, when retested, all passed successfully and their certificates were renewed. We consider remarkable progress is made, when the first test conducted under the accredited plan in Pennsylvania was not made until April, 1918, when up to January 1, 1921, 104 of the 115 herds that were tested during 1918 are accredited.

In reference to placing herds in the accredited class, the Bureau's policy is to proceed with caution, in order that such herds will continue to remain accredited. In other words, we much prefer quality than volume. If we can have both, well and good.

During the last two years we found rather a steady increase in the number of reacting animals in which, when slaughtered, we were unable to demonstrate the disease on autopsy or laboratory examination. Excluding a small percentage, which can reasonably be charged to incomplete autopsy examination, different men especially trained in postmortem examination work were given a number of opportunities to conduct postmortems on animals from herds which revealed a number of no-lesion cases. They, in turn, met with the same results in not being able to demonstrate visible lesions. In the case of practically every animal in which, when slaughtered, no visible lesions were found, specimens were submitted to the laboratory for a complete examination, and with very few exceptions preliminary and final reports from the laboratory showed examinations were negative to tuberculosis.

In a paper presented by the writer at the 1920 A. V. M. A. convention, Columbus, it was shown that the work that had been done in Pennsylvania in connection with herds under supervision did not agree with the authorities that the tuberculin test was 98 per cent efficient, in so far as being able to demon-

strate the disease on autopsy, except when the tuberculin was used the first time on a herd. We are then able to find lesions in practically 100 per cent of the reacting animals.

TABLE 2.—HERDS TESTED UNDER ACCREDITED PLAN, FROM APRIL, 1918, TO JULY 1, 1920.

Test	Herds	Cattle	Re-acted	Per cent	AUTOPSY				Tank-ed	Per cent
					Lesions.		No lesions.			
					Pos.	Eff.	Neg.	Ineff.		
Initial test....	964	16,693	1,532	9.	1,285	91	114	8	191	13
First retest....	473	8,306	218	2.	133	84	25	16	10	6
Second retest..	78	1,801	33	1.	20	71	8	29	2	7
Third retest...	5	193	1	.5	0	0	1	100	0	0

Note—Table 2 covers the work from April, 1918, to July 1, 1920. In connection with this table, on the initial test 133 animals were not slaughtered; first retest, 60 animals were not slaughtered; second retest, 4 animals were not slaughtered.

TABLE 3.—HERDS TESTED UNDER ACCREDITED PLAN FROM APRIL, 1918, TO JANUARY 1, 1921

Test	Herds	Cattle	Re-acted	Per cent	AUTOPSY				Tank-ed	Per cent
					Lesions.		No lesions.			
					Pos.	Eff.	Neg.	Ineff.		
Initial test....	1,393	23,847	2,330	9.	1,860	93	144	7	288	14
First retest....	718	13,004	518	3.	334	89	41	11	24	6
Second retest..	208	4,471	49	1.	33	71	10	29	2	4
Third retest...	28	651	6	.9	2	67	1	33	0	0
Fourth retest..	1	37	0							

Note—Table 3 covers the work from April, 1918, to January 1, 1921. On the initial test 326 animals were not slaughtered; first retest, 143 animals were not slaughtered; second retest, 6 animals were not slaughtered; third retest, 3 animals were not slaughtered.

It will be noted that the same arrangement or scheme is carried out in connection with both Tables 2 and 3. In reference to Table 3, the initial test means the first test of 1,393 herds that were tested under the accredited plan. A large number of these herds had been previously tested under a former State plan. This, no doubt, may account for being unable to demonstrate the disease in but 93 per cent of the reacting animals that were slaughtered. The first retest or second test of these herds was applied, depending on the results of the initial test:

A. If a herd passed successfully on an initial test, the first retest would be applied a year later.

B. If a herd on initial test revealed less than 10 per cent reactors, the first retest would be applied six months later.

C. If a herd on initial test revealed 10 per cent or more reactors, the first retest would be applied sixty days later.

D. As soon as a herd passes a successful test, the next test is applied a year later.

The first retest is a second test covering 718 of the 1,393 herds.

The second retest is a third test covering 208 of the 1,393 herds.

The third retest is a fourth test covering 28 of the 1,393 herds.

The fourth retest is a fifth test covering 1 of the 1,393 herds.

By observing both tables there are four outstanding facts:

1. Tuberculosis is practically eradicated after the first retest. As will be noted on Table 3, the percentage of tuberculosis is 1 per cent as the result of the second retest. Assuming that the 6 animals not slaughtered, as the result of the second retest, will show lesions when slaughtered, plus the 33 that have been slaughtered that showed lesions, the actual amount of tuberculosis would be 0.8 per cent.

2. As the disease decreases, the inefficiency increases, in so far as being unable to demonstrate the disease on autopsy or laboratory examination. After this fact was definitely determined, in certain class of herds, before final judgment is passed on an apparent reactor, as a result of other than the first test, by taking the history of the herd into consideration, which includes a number of things, such as condition of the premises, length of time the herd was under supervision, the number of added animals and their source, if the history is favorable such animals are check-tested before they are condemned. By doing this, it will be noted by comparing the two tables, our efficiency has slightly increased during the last six months.

3. There is an occasional herd from which, after each test, tuberculous animals are removed. By referring to Table 3 it will be noted that on the second retest 208 herds comprising 4,471 cattle were tested with the result that 49 reacted. The 49 reacting animals were obtained from 24 herds. On the next test or third retest covering 28 herds, the 6 reacting animals came from 4 of the 28 herds divided as follows: Two each from 2 of the 4 herds, and 1 each from the 2 other herds. Three of the 6 animals have not been slaughtered. The percentage of reacting animals as the result of the initial test on these 4 herds ran from 20 to 37 per cent. To a certain extent

the coöperation was somewhat lacking in 2 of the 4 herds. Faulty sanitation, no doubt, played a part in connection with each herd. Where the disease can not be properly eradicated as the result of two tests, it is generally found that the fault lies to one or more of the three causes: (1) Faulty sanitation; (2) improper cleaning and disinfection of the premises following removal of reactors; (3) faulty technique and improper interpretation of the test.

4. Taking into consideration the number and percentage of reactors on the initial test, and the number tanked, and by comparing it with the records during the first five years' existence of the Pennsylvania Bureau of Animal Industry (1896 to 1900, inclusive) we can state that the percentage of tuberculous animals found in the herds tested today, by the extent of the disease, has been reduced 50 per cent.

A year ago a definite policy was adopted as to the time and kind of test that should be applied to different classes of herds covering cattle under supervision. Most of you are familiar with the policy, as it has been published in connection with the paper presented at A. V. M. A. meeting, Columbus, 1920. In connection with one phase of the policy, if in a herd as the result of the initial test more than 10 per cent reacted, or if the history of a herd was such that we believed it to be extensively affected, or if in a herd which continued as the result of two tests a number of reactions were obtained, a combination test was applied to such herds.

Table 4 covers 77 distinct herds tuberculin tested by the combination method (subcutaneous, intradermal and ophthalmic), comprising 2,278 cattle, of which 362, or 15 per cent, reacted. In practically all the combination tests applied to these 77 herds the eye was sensitized in connection with the ophthalmic test. The intradermal tuberculin was injected, followed three days later by the second instillation of ophthalmic tuberculin. After the usual number of pre-injection temperature measurements, the subcutaneous tuberculin was injected.

TABLE 4.—COMBINATION TESTS

Test Period	Herds	Cattle Tested	Reacted	Per cent	R. only to Sub.	Per cent Efficient	R. only to Ind.	Per Cent Efficient	R. only to Oph.	Per cent Efficient	R. only to S. and I.	Per cent Efficient	R. only to S. and O.	Per cent Efficient	R. only to I. and O.	Per cent Efficient	R. only to all 3 tests	Per cent Efficient	R. to Sub.	Per cent Efficient	R. to Ind.	Per cent Efficient	R. to Oph.	Per cent Efficient
First.....	7	283	38	13	2	5	.....	.....	.....	.....	1	3	1	3	3	8	31	81	35	92	36	92	35	92
60-day....	17	441	119	26	2	1	8	6	8	6	2	1	9	7	38	31	52	43	65	50	100	83	107	89
90-day....	21	444	84	18	2	2	16	19	7	8	7	8	3	4	31	.....	18	22	30	35	72	85	59	72
120-day....	4	76	9	11	1	11	.....	.....	.....	.....	1	11	1	11	.....	.....	6	66	9	81	7	62	7	62
150-day....	3	87	18	20	.....	.....	1	5	.....	.....	4	22	4	22	4	22	5	27	13	72	14	77	13	72
180-day....	10	230	19	8	1	5	.....	.....	4	21	.....	.....	1	5	10	52	3	16	5	26	13	68	18	94
210-day....	5	75	5	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	100	5	100	5	100	5	100
240-day....	4	196	50	25	3	6	.....	.....	7	14	1	2	3	6	13	26	23	46	30	6	37	74	46	92
270-day....	3	43	2	4	.....	.....	.....	.....	.....	.....	1	50	1	50	.....	.....	.....	.....	2	100	1	50	1	50
300-day....	1	134	8	5	1	12	.....	.....	1	12	.....	.....	.....	.....	5	62	1	12	2	25	7	87	6	75
390-day....	1	166	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
420-day....	1	103	10	9	.....	.....	.....	.....	1	10	.....	.....	.....	.....	8	80	1	10	1	10	9	90	10	100
Total....	77	2278	362	15	12	3	26	7	27	7	17	4	23	6	112	30	145	40	197	54	301	82	307	85

"R. only to Sub." means animals which reacted only to the subcutaneous; negative to all other tests.

"R. only to Ind." means animals which reacted only to the intradermal; negative to all other tests.

"R. only to Oph." means animals which reacted only to the ophthalmic; negative to all other tests.

"R. only to S. and I." means animals which reacted only to the subcutaneous and intradermal; negative to all other tests.

"R. only to S. and O." means animals which reacted only to the subcutaneous and ophthalmic; negative to all other tests.

"R. only to I. and O." means animals which reacted only to the intradermal and ophthalmic; negative to all other tests.

"R. only to all three tests" means reacted to subcutaneous, intradermal and ophthalmic.

"R. to Sub." means number reacted to subcutaneous. Animals under this head may also have reacted to either the intradermal or ophthalmic, or both.

"R. to Ind." means number reacted to intradermal. Animals under this head may also have reacted to either the subcutaneous or ophthalmic or both.

"R. to Oph." means number reacted to ophthalmic. Animals under this head may also have reacted to either the subcutaneous or intradermal, or both.

By test period is meant the tests were made at different days as indicated, following the subcutaneous test, except the 7 herds as indicated on the first line. The 7 herds under test period will be noted the combination test was the first test applied to these herds under the accredited plan.

It will be noted by referring to Table 4 that each single test and the various combinations had some value.

The 362 reactors are divided as follows:

12	reacted to subcutaneous only, or efficiency of	3 per cent
26	reacted to intradermal only, or efficiency of	7 per cent
27	reacted to ophthalmic only, or efficiency of	7 per cent
17	reacted to subcutaneous and intradermal only, or efficiency of	4 per cent
23	reacted to subcutaneous and ophthalmic only, or efficiency of	6 per cent
112	reacted to intradermal and ophthalmic only, or efficiency of	30 per cent
145	reacted to all three, or efficiency of	40 per cent
362		97 per cent

By referring to the last six columns of Table 4 the following will be noted:

197 reacted to subcutaneous, or efficiency of 54 per cent
300 reacted to intradermal, or efficiency of 82 per cent
307 reacted to ophthalmic, or efficiency of 85 per cent

The number that reacted to the subcutaneous may also have reacted to either the intradermal or ophthalmic, or both. Of the number that reacted to the intradermal, they may also have reacted to the subcutaneous or ophthalmic, or both. The number that reacted to the ophthalmic may also have reacted to either the subcutaneous or intradermal, or both.

The best single test in combination, according to this table, was the ophthalmic. The best combination of two is the intradermal and ophthalmic. Recently we have been check-testing animals by the intradermal and ophthalmic method, following the subcutaneous test, with good results. By the method used in which the combination tests were applied, as stated above, covering 77 herds, covered by Table 4, it has been pointed out by our Bureau and others by applying the combination tests in this manner that it lessens the number of subcutaneous reactions and increases the number of intradermal reactions.

By changing the order of their application, i.e., after the preinjection temperature measurements are taken in connection with the subcutaneous test, injecting the tuberculin, followed immediately by the injection of the intradermal tuberculin, and sensitizing the eye (this order is known as the simultaneous method), we increase the number of subcutaneous reactions and lessen the number of intradermal reactions.

Regardless of the order in which the subcutaneous and intradermal is applied in combination with the three, it seems to make no difference with the ophthalmic test. Rather the two tests increase the efficiency of the ophthalmic test. It will be

noted in the table that the ophthalmic test is quite valuable. However, it is not as desirable a test as the other two, for the reason that it is subject to so many interferences. We have a code in which ophthalmic reactions are recorded as follows:

Small amount of pus P-1
Much pus P-2
Abundant pus P-3

We were unable to demonstrate the disease in a number of animals when slaughtered which were negative to the other tests and gave a positive reaction to the ophthalmic, less than P-3. Therefore, according to our policy, unless animals give a P-3 reaction or mucopurulent discharge and are negative to the other two tests, they are classed as negative or suspects.

We have no favorite test, our object being to remove tuberculous animals from the infected herds in the shortest possible time. It concerns us very little which test they react to, as long as the diseased animals will react, whether to only one of the three tests, or whether in combination or single, and on autopsy we are able to demonstrate the disease. We do know that the combination tests are indispensable. If they had not been used in Pennsylvania we would never have been able to eradicate the disease from the class of infected herds indicated above.

In Pennsylvania some thought has been given to area work. In fact, it was planned to give it a trial in a small way, especially in those counties where considerable testing had been done under the accredited plan, or in those sections where the owners would place their herds under the plan on a 100 per cent basis in a voluntary manner. A number of counties in other States doing area work have made specific appropriations in order to aid the Federal and State bureaus. Those interested in the Grove City community were in favor of asking the officials of Mercer County to appropriate funds for this purpose, but it was found that the officials of the county did not have legal authority to appropriate funds. In order to overcome this difficulty the present Legislature will be asked to enact such a law that will give any county such authority to assist in the accredited herd work, if it so desires.

TABLE 5.—ACCREDITED PLAN, APRIL 1, 1918, TO JANUARY 1, 1921
MERCER COUNTY

201 herds tested
126 herds 596 purebred cattle
184 herds 1,598 grade cattle
2,194 cattle under supervision
151 herds accredited
171 herds credited with one negative test

Had the work been started in Mercer County, it was planned to group the herds tested in that county according to townships and start area work in the township having the largest number of herds under supervision.

Our Bureau early recognized the value of the intradermal test in combination with the subcutaneous and ophthalmic tests. However, it is not recognized as an official single test in Pennsylvania, chiefly for the reason that it is a comparatively new test, in comparison with the length of time the subcutaneous has been used. We do know the value of the subcutaneous and its limitations, which is more than we can say about the intradermal. The other reason is the wide difference of opinion in the interpretation of the intradermal test.

By testing and retesting free and infected herds a sufficient number of both classes has given us a very good idea as to the value of the subcutaneous test. We found that in retesting free herds the subcutaneous test had an efficiency of 98 per cent. One of two things, or both happened to account for the 2 per cent inefficiency. The animals which reacted on the second test after having passed successfully on the first test either became infected between the two tests or they escaped the first test.

We do know that in testing herds which are infected, as a rule the higher percentage of infected animals found in such herds the larger the number that will escape the first test. In checking up a large number of infected herds in which more than 10 per cent reacted, it was found as the result of the second test that the subcutaneous test showed an efficiency of 87 per cent. It is likely that a small percentage became infected between the first and second tests, but the majority, no doubt, escaped the first test.

In order to determine the efficiency of the intradermal test as compared with the subcutaneous test, it has been decided to execute the following project:

Group A, 150 herds. Initial test, intradermal. Sixty-day retest, subcutaneous and ophthalmic.
Group B, 150 herds. Initial test, subcutaneous. Sixty-day retest, intradermal and ophthalmic.
Group C, 150 herds. Initial test, ophthalmic. Sixty-day retest, intradermal and ophthalmic, or subcutaneous and ophthalmic.

If it is found from the work that is being done in other States where the intradermal test is used as a single test, and the results of the project show that we can obtain as good results as we are now obtaining with the subcutaneous, the intradermal test will be adopted as a single official test.

The accredited plan was amended December, 1920. The important changes are briefly as follows:

1. After the reacting bull is no longer in the herd, that herd may be accredited after passing two successful tests not less than six months apart.

2. The final test before a herd shall become accredited shall be a combination of the subcutaneous and ophthalmic, or the intradermal and ophthalmic.

3. Accredited herds revert to the owner to be tested by qualified practitioners at owners' expense after they are accredited for a period of one year.

Practitioners have played a large part in connection with the results that have been accomplished in Pennsylvania under the accredited plan, no doubt more than a great many realize. They have assisted in making herd tests and have advised owners to place their herds under the plan when they knew they were losing an immediate fee. Further, they have tested approximately 4,000 cattle in small lots that were first or second tests on added cattle, or those for sale purposes. At this time we wish to thank the practitioners for their coöperation.

Infected herds can be freed of tuberculosis by two tuberculin tests with few exceptions:

1. By careful application and interpretation of the tuberculin tests.

2. By prompt removal of the infected animals.

3. By a thorough cleaning and disinfecting of the premises.

4. By immediate improvement of sanitation, if faulty.

5. By not feeding calves on milk from doubtful sources, unless properly pasteurized.

Accredited herds will continue to remain accredited, if owners will comply with the following:

1. By correcting sanitation, if faulty.
2. By cleaning and disinfecting stables, etc., at least once a year.
3. By guarding the herd against exposure from a neighbor's herd, providing the health of the latter has not been determined.
4. By feeding calves pasteurized milk, unless the milk is from tested animals.
5. By using extreme care in adding new animals to herd.
6. By keeping cattle separate and apart from cattle of herds not under supervision, if shown on exhibition.

MEXICO FIGHTS DISEASE

President Obregon of Mexico is alive to the necessity of improving the cattle of his country and of reducing losses from disease. A law has recently been enacted compelling breeders of that Republic to take measures for the prevention and control of the various diseases of cattle. The owners of cattle are required to report to the Mexican Department of Agriculture all diseases occurring among their animals and are thereafter required to follow the instructions of that department for their treatment.

Wisconsin Farmer says editorially of tuberculosis-eradication work: "It is reasonable to expect, then, that as tuberculosis is eradicated from our cattle herds by means of the tuberculin test it will also be eradicated from our swine herds. Now is the time for every livestock owner to take on an individual responsibility in fighting tuberculosis."

Dr. L. H. Howard, Director of the Massachusetts Bureau of Animal Industry, was one of a commission to draw up new regulations for the control of bovine tuberculosis in his State. The commission recommended a maximum remuneration to owners of $125, and that trafficking in tuberculous animals be made a criminal offense.

THE RELATION OF VETERINARY EXTENSION WORK TO THE PRACTICING VETERINARIAN, THE LIVESTOCK INDUSTRY AND THE PUBLIC HEALTH [1]

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THE VETERINARY profession today covers a wide field of endeavor. The general public is almost totally uninformed of its various activities. Indeed many veterinarians do not realize that they are fundamentally trained to handle, as well or better than any other class of men, a great variety of problems pertaining to the breeding, feeding, care and health of livestock, general and special problems in sanitation, and the protection of the public health against disease transmitted through the medium of animal food products or by contact and association with diseased animals and their non-edible products. It is therefore not uncommon, largely on account of local circumstances and personal preferences, to see certain of its fields being well taken care of and sufficiently handled in a section of the country, while others are neglected. If all our activities were carried on as well generally over the country as each of them is in certain localities, the service rendered by the profession would be greatly increased. It takes the entire Nation to furnish a few isolated instances of where veterinarians have entered the so-called new fields of activities for which their training properly fits them, for example, the position of county agent in counties where livestock raising or dairying is the principal agricultural pursuit, and the position of manager or superintendent of large livestock farms.

Twenty years ago agriculture in this country was not well organized. Veterinarians were scarce and their time was taken up in caring for horses, largely situated in urban communities. It was, therefore, not necessary for them to be in very close contact with agriculture. Since that time agriculture has been undergoing a vast amount of organization. The Smith-Lever Act, the Smith-Hughes Act and the Farm Loan Act have come

[1] Presented at the meeting of the Pennsylvania State Veterinary Medical Association, Harrisburg, January 26, 1921.

into operation, constituting the three most important legislative milestones of recent times for the improvement of agriculture. The Smith-Lever Act created the farm adviser or county agent system. The Smith-Hughes Act created vocational agricultural training in the high schools, under which have been developed the boys' pig clubs and calf clubs of such great potential value in the improvement of livestock. The Farm Loan Act, despite its deficiencies, has made it possible for farmers to obtain long-time loans at a reasonable interest rate. Supplementing this official organization of agriculture, we have a great variety of very potent and energetic special organizations, such as the livestock breed and dairy associations, wool growers' association, poultry breeders' asociations, and in plant industry an even greater number of organizations.

The exigencies of the war caused the county agent system to extend more rapidly than the bill originally intended, and as a consequence practically all of the agricultural counties in all of the States are at present supplied with such officials. While this system, on account of its rapid development, had some difficulty in finding itself at first, today we see in it a wonderful organization, taking up all matters pertaining to rural life, from the installation of water storage and irrigation systems, costing millions of dollars, to showing the farmer's wife, through the home demonstration agent, how to trim her new Easter bonnet. When the agent in his county meets with a problem on a farm with which he is unable personally to cope he is free to call upon the specialist, in whatever the subject matter may be, from the State agricultural college, with which he is definitely linked, for the solution of the problem. That specialist may be in any one of the many divisions which go to make up the college of agriculture of today, including in most States a division of veterinary medicine.

What has become of the veterinary profession during this period of organization of agriculture? The automobile has supplanted the horse to a large extent in the urban communities, where most veterinarians are situated, and the use of tractors has been on the increase in rural communities. Despite the coincident rise in the value of food-producing animals and the development of need for veterinary services in many lines, veterinarians have been slow to take on new fields of activities. Those

men who have devoted their time for years entirely to horse practice have been particularly slow in taking up work among other classes of livestock. Rather than do so, many have become interested in other lines of business. The important fields of practice today are in the food-producing animals, and except in large cities, where small-animal specialists do well, most practitioners do some work among this class of animals. The vast amount of knowledge accumulated on the horse is in text-books, while that accumulated on food-producing animals is less in quantity and largely of recent origin. It still remains in bulletins or periodicals and unpublished in the minds of practitioners where it has developed as a result of individual experiences since changing conditions have directed practice among this class of animals. For example, it is still necessary in the teaching of anatomy in our veterinary colleges to use the horse as the principal subject animal, because our text-books are written and illustrated from horse dissection. Many practitioners, whose territory does not contain very many animals of certain species, have not become proficient in the diagnosis and treatment of diseases affecting them. As a consequence they are often indifferent about answering calls to such animals, resulting in unnecessary loss; while in other parts of the country such cases may constitute the principal work of the practitioners.

In the State of Pennsylvania educational matters in veterinary medicine have always been located in the Veterinary Department of the University of Pennsylvania. It is recognized today that educational institutions have three definite lines of work to pursue, and when receiving public funds for support their full duty to the commonwealth is not being met unless all are in active progress. These three activities are resident instruction, research, and extension. The institution believes—and I think that you will agree with it—that its first duty in veterinary extension is to the veterinary profession, and its object is to make all lines of veterinary activities in this State as efficient as any one of them is in any other part of the country. Veterinary extension work among veterinarians is of value at this time to gather facts from the various practitioners, research and official veterinarians and distribute them to others, along with the latest written word on the diseases of animals which are either not settled or so recently settled that they are

not to be found generally in text-books. All of us are cognizant of the developments in the treatment of abortion disease and its allied conditions. To carry on this work requires special training. It has come into general practice since the great majority of us left college. Most veterinarians in this State, who have become proficient in its application, have received the special training from the officials of the State Bureau of Animal Industry who are specializing on the work, and this constitutes an example of veterinary extension work. Where an individual veterinarian is working as extension man it is fully recognized that he can not in person furnish all the information and carry out the procedures that are included in the field of veterinary medicine. Under such conditions, where problems arise with which he is unable personally to cope, he must be free to call upon the faculty of the college for assistance from the chair covering the particular subject matter. In this State, where fortunately such cordial relations exist between the college and the regulatory authorities, and where the regulatory authorities are so splendidly organized as they are here, it is hoped that they will very frequently be able to furnish specialists to aid the practitioners, as they have so well done in the past. Such developments and coöperation keep pace with the organization of agriculture and make veterinary medicine a part of the organization, instead of being uninterested bystanders, or even objectors, as has been the case all too frequently in the past.

An organized agriculture is an efficient agriculture. Veterinary medicine has nothing to fear from an efficient agriculture, because one of the two great subdivisions of agriculture, namely, animal industry, can not be efficient without an efficient veterinary medicine. It has been well said that veterinary medicine is the servant of the livestock industry, as human medicine is the servant of the human race. In the exercise of that service, which we may well be proud to carry, it will forever be necessary that veterinarians be leaders in the shaping of some of the policies that will direct the industry, just as physicians must shape and direct the policies of the human race that deal with the public health. The more thoroughly organized and efficient our agriculture becomes, the more it will recognize the need for and place of an efficient veterinary personnel in all the activities with which veterinary medicine deals.

VETERINARY EXTENSION AND THE LIVESTOCK INDUSTRY

While the work was primarily intended to be carried on among veterinarians, there are times and conditions when its activities should be carried directly to the livestock interests. When research has definitely solved certain problems relating to disease in livestock, it is necessary to get the facts definitely before the individual livestock owner before the results of research can be made of practical use. An example of educational campaigns among livestock owners was seen in the Texas fever tick eradication work. In most counties in the South educational work had to be carried on to educate the livestock owner to the procedure before actual eradication work began. To take another example of more direct interest to the practitioners and affecting most sections of the United States today, I would cite the poultry industry. This has developed wonderfully in the past ten years. The poultry husbandry divisions of our colleges of agriculture are important parts of the work in animal husbandry. They have placed poultry raising and egg production on a sound basis. Highly efficient methods of culling the flocks, feeding, housing and electric lighting have been developed to increase financial returns from the industry. The greatest factor today jeopardizing the profitableness of the business is disease. It is probable that a higher percentage of loss will be sustained by this class of breeders without their going out of business than is the case in those handling other classes of livestock. Very little research, comparatively speaking, has been carried on among this class of food-producing animals. On account of the virgin field, however, some definite results have been obtained. These facts need to be carried to the poultryman as well as to the veterinarian, and the farmer needs to be informed that veterinarians are prepared to render him valuable assistance in the prevention of losses from disease in his flocks. Poultrymen can afford to pay and will gladly pay fees for properly informed veterinary services, rendering this an attractive field to practicing veterinarians situated in poultry raising districts.

VETERINARY EXTENSION AND THE PUBLIC HEALTH

Veterinary medicine in its public health activities has a close association to human medicine. This is also the case in many of

our research problems, on account of discoveries of the cause and prevention of animal disease being often of fundamental importance in the solving of human problems. I would cite the elucidation of the *Piroplasma bigeminum* as the etiological factor in Texas fever, furnishing the lead from which the human malarial parasite was found. In research, veterinary medicine and human medicine come in closest association, and extension, although having no place in this field, is glad to pay tribute to it. It is the new truths brought out by men devoting their lives to this class of work which extension is so anxious to receive in order that it may be the means through which such facts can be put into general application. Extension may only ask the courtesy of conference with research in order that it may bring to the attention of the latter the problems which at any particular time, in any particular locality, are those most seriously needing elucidation, fully realizing that research must be allowed to accept or leave the problems as it sees fit after due consideration.

In public health matters, however, veterinary extension has definite fields in which it can be of service. This is a field which, although it will always be of less importance than our agricultural connections, has possibilities which are the least realized by the public as well as ourselves today. The health problems, involving the time of health officials in small cities, are mostly of such a nature that the training of veterinarians renders them the logical persons to be called upon for their solution. In such communities the problems of meat and milk inspection, garbage disposal and sanitary and safe manner of keeping various domestic animals on city lots occupy much more time than the handling of infectious diseases of humans, the supervision of the work of city nurses, vital statistics, etc. I have in mind one city of 20,000 population in this country, where the full-time health official is a veterinarian with the title of health officer, and a medical man is on part time with the title of city physician. This was done because the problems in this community are principally meat and milk inspection and garbage disposal. It has been definitely shown by the United States Food Administration and others that the efficient and economical method of disposal of city waste, since the advent of anti-hog-cholera serum and virus, is by segregation and

feeding the edible portions to hogs, rendering this largely a veterinary problem. This is particularly the case when the city carries on hog feeding itself. Any urban community which employs only one full-time professional man in its health office will do well to consider the advisability of selecting a veterinarian for the place. On the other hand, every community, whether large or small, is not efficient in its government unless a veterinarian is employed part time for counsel in regard to certain of its health problems. Veterinary extension would be doing a service, when opportunity offered, to present such facts to those who are in a position to give them consideration and act upon them.

VETERINARY EDUCATION

I can not close without a word in regard to veterinary education. Despite the fact that the future need of veterinarians is going to be at least as great as in the past, student attendance in our veterinary colleges has dropped to a very low point. Many predict that this will result in a shortage of veterinarians in the future. The reduced attendance has several causes, among which might be mentioned, first, the idea of the general public that there is no need for veterianarians, now that the automobile and tractor have increased so greatly; second, the opportunity that high-school graduates have had in recent years for making good salaries in commercial lines; third, that men past the high-school age who would like to study veterinary medicine have not had sufficient preliminary training to do so; to which might be added the present high cost of college training, and so on. With the type of work that veterinarians of the future must do, and the fact that they will more and more come in contact with agricultural college graduates well grounded in the fundamental sciences, it is essential that the preliminary entrance requirements be kept at the present level. To get the facts regarding the future of veterinary medicine before the high-school boy and the public in general may be a part of the work of veterinary extension. It is, however, a situation that every veterinarian should be informed upon and talk intelligently about whenever and wherever the opportunity offers.

In conclusion we would like you to understand that the extension work is now in progress. It is the desire of those who

originated it, as well as those who are carrying it on, to have it become of service to the veterinarian and through him to the livestock industry and the public health. We therefore solicit your coöperation and ask you to call upon us without hesitation on any educational matter pertaining to your work, and we assure you that no source of information at our command will be overlooked in an attempt to be of assistance.

LICE ON HORSES

Dr. W. R. Lukens, of Hillsboro, Ohio, suggests the following method for detecting lice on horses and cattle:

"Sometimes lice are difficult to find on a horse. I have devised a method of locating them that I have never seen in print. Lice do not like the light and if the animal is led out into a bright light, particularly sunlight, and allowed to stand a few minutes, the lice will seek protection by crawling to the darkest places. After the horse has stood in the sunlight a few minutes it should be led into a dark stable, the darker the better. In about one minute turn an electric torch on the animal and the lice will be seen crawling on the ends of the hair or coming up towards the surface. They can be seen very easily."

HIS ONLY FAULT

Mr. Klinker was negotiating with a horse dealer. "I am," he said, "not so particular about speed, but I must have a gentle horse for my wife to ride. Will you guarantee this horse to be safe?"

"Certainly," said the dealer. "He's a regular lady's horse."

"You are sure he's not afraid of anything?" asked Mr. Klinker, anxiously, and for the tenth time.

Whereupon the dealer assumed an air of reflection.

"Well, there is one thing that he has always appeared to be afraid of since I got him," he admitted, conscientiously. "It seems as if he's scared to death for fear some one might say 'Whoa!' and he not hear it."—*Harper's Magazine.*

PRODUCTION AND INSPECTION OF BIOLOGICAL PRODUCTS [1]

By D. I. SKIDMORE

Chief, Division of Virus-Serum Control, Bureau of Animal Industry, Washington, D. C.

DOUBTLESS some of you will recall that a paper, prepared by Drs. Mohler, Ward and Shore, was read before this Association at its annual meeting held in Kansas City, Missouri, in August, 1917. In that paper the purpose and scope of the requirements of the Bureau of Animal Industry pertaining to the preparation, sale, importation, etc., of veterinary biological products were recited to you in as comprehensive a fashion as the time alloted to the subject would permit. It also touched upon the production of the different classes of biologic products which were at that time being prepared under a license. It is therefore neither necessary nor advisable for me to consume valuable time in reviewing the subject matter of their paper. Those who are interested will find it in the March, 1918, issue of the JOURNAL of this Association.

In the remarks that I have to make it is my purpose to deal briefly with the more important and outstanding features relating to the production and inspection of biologic products which have presented themselves for consideration since the Kansas City meeting.

CLASSIFICATION OF LICENSED ESTABLISHMENTS

For administrative purposes licensed establishments are divided into two general classes with regard to the nature of the products that are produced and the degree of supervision given to the preparation of these products. In one instance the class consists of those licensed establishments preparing biologic products which, even though improperly prepared, are not likely to endanger large numbers of livestock and the livestock industry in general. On account of these considerations and the lack of sufficient funds to do otherwise, the supervision of this class of establishments is of a general and coöperative nature. The products prepared by these establishments include aggressins,

[1] Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.

tuberculins, mallein, bacterins and serobacterins, vaccines and serovaccines, viruses exclusive of hog-cholera virus, toxins, tetanus antitoxin, and antibacterial sera of various kinds other than anti-hog-cholera serum.

In the other instance the class consists of licensed establishments preparing anti-hog-cholera serum and hog-cholera virus. On account of the importance of these products and their universal use for protecting the swine industry and the country s food supply, establishments engaged in their production are supervised closely and directly by trained Bureau employees. Experience has demonstrated the necessity for this procedure in order that a supply of pure and potent serum and virulent virus may be available at all times for the prevention of hog cholera and to insure that these products will not endanger the food supply and the livestock industry through exposure to dangerous and costly infectious diseases.

SUPERVISION AND CONTROL OF LICENSED ESTABLISHMENTS IN CLASS 1

In order to control as effectively as possible the production and marketing of the several classes of products such as bacterins, vaccines, etc., named in connection with the first class of establishments, the territory in which these establishments are located has been divided into districts over which an inspector in charge in the Division of Virus-Serum Control, who is located within the district, is given jurisdiction.

Before a license is issued to an establishment in this class an inspector visits the plant and makes an inspection of its construction, sanitation and equipment, together with the technique and methods used in producing each product for which a license is requested. Subcultures of organisms and samples of products are collected and submitted to laboratory examination. Detailed reports of the inspection are likewise submitted to the Bureau for consideration in connection with the laboratory findings. If all conditions are found satisfactory a license is issued, but if not, such helpful suggestions as may be indicated are made to the applicant. After the issuance of a license an authorized inspector visits the establishment periodically and at irregular intervals for the purpose of observing conditions and to see that the products are properly handled, labeled, etc. Re-

ports are prepared regularly giving the quantity of each product produced. From time to time samples of products are collected, for laboratory examination, direct from the producer and by purchase upon the open market. If found contaminated or otherwise unsatisfactory the product is recalled from the market and destroyed.

For the successful control of these establishments much depends upon the integrity, vigilance and efficiency of those responsible for the production and distribution of the products. Honesty and eternal vigilance are prime requisites in the production of satisfactory biologic products. Manufacturers and the Bureau are both called upon to reckon with the personal equation and human fallibilty. However, much has been accomplished by the procedure followed, and the products that are prepared today, particularly those of proven value, are of a higher class than in former years.

ANTI-HOG-CHOLERA SERUM AND HOG-CHOLERA VIRUS ESTABLISHMENTS

With reference to the class of licensed establishments which prepare anti-hog-cholera serum and hog-cholera virus our supervision and inspection is continuous. A force of trained veterinarians and lay inspectors is maintained by the Bureau in these establishments for the purpose of personally supervising all activities relating to the production of these products. The duties of these employees involve the inspection of all animals presented for admission to the premises. They also involve the inspection of each animal before inoculation, hyperimmunization or bleeding. In short, every step in the production, testing, bottling and labeling of the products is done under the direct supervision and direction of a Bureau employee who maintains his own records and reports his activities to the Bureau daily. In addition, samples of the products are collected from time to time and submitted to laboratory examination to determine their bacterial content, and, if circumstances are believed to warrant this action, retests for potency are also made.

Clear Serum

What is known as clear anti-hog-cholera serum is now being prepared quite extensively by a number of establishments. This

product is prepared from hyperimmune blood mechanically defibrinated, or from such blood defibrinated by the action of heat, the fibrin of which is held in solution by treating the whole blood with sodium citrate. By adding to this blood, at the time of collection, a small volume of a semisaturated sodium citrate solution its spontaneous clotting is prevented by the union of the citric acid in the sodum citrate with the calcium of the blood to form calcium citrate. In this way the calcium is removed from solution in the blood and spontaneous clotting does not then occur. The application of heat to this citrated blood, from which the corpuscles have been removed, precipitates the fibrin, which can then be eliminated readily by subjecting the product to centrifugation.

Clear serum prepared from citrated blood is opalescent, and may be slightly red in color, while that prepared from mechanically defibrinated blood is of a deeper red color. Both are clear of cell débris, but neither is transparent. This red color in each instance is due to the hemolysis or dissolution of the red corpuscles, which may be largely prevented by collecting each bleeding in a sodium citrate solution. At times this serum will be observed to contain slight precipitates due in one instance to the action of the preservative while in the other it is believed to be caused by the presence in the blood of the elements of digestion. In neither case do these precipitates, if present, affect the potency of the product.

The chief physical difference between ordinary defibrinated blood serum and clear serum is in the removal of the corpuscles from the latter product. To accomplish this object either the defibrinated blood or the citrated whole blood is treated with 1 per cent of bean extract to agglutinate or clump the inert cells. This agglutination takes place in a few minutes and can readily be observed by the naked eye. At this point 3 per cent of a saturated solution of sodium chloride is added to crenate or squeeze the cells, which action removes the cell fluid and assists in washing the cell mass comparatively free of serum. After a few minutes the material is centrifuged for about 30 minutes to separate and pack the cells so that it is an easy matter to decant or pour off the supernatant serum. From this point methods vary to some extent, but the product is usually heated, and if citrate has been used it must be centrifuged again or otherwise handled to re-

move the precipitated fibrin. To this clear serum there is added a sufficient quantity of a 5 to 10 per cent solution of phenol to make the finished product contain 0.5 per cent of phenol by volume.

In the early days of serum production the serum of the blood was not separated from the cells, because in the process of separation a large part of the true serum or antibody content was lost, and the small volume of true serum left after removing the cells would have proved too costly for practical use. By the use of the bean-salt method an average of about 67 per cent of the whole blood or 70 per cent of the defibrinated blood can be recovered in the form of true serum; otherwise only 35 to 40 per cent can be obtained. The clarifying solutions are, of course, not removed from the serum in centrifugation and must be reckoned with in the completed product in addition to the preserving solution. Further, it is the practice of some firms to add phenolized physiological salt solution to replace partially the volume lost in removing the corpuscles. For this reason there are two distinct classes of clear serum, with regard to potency or dosage, upon the market at the present time. In one class the antibody content is concentrated, and in the other it is not concentrated but contained in practically the same volume as in ordinary defibrinated blood serum.

Composition and Dosage of Anti-Hog-Cholera Serum

Rules governing the preparation, composition and use of these two classes of serums have been promulgated recently by the Bureau. In order that the compositions of these serums may be compared one with the other and with ordinary serum, let me give you a brief outline of the component parts of each. In the first place it should be stated that carefully conducted experiments have shown that an average of about 70 per cent of defibrinated blood can be recovered as true serum by the proper use of the bean-salt method. It is estimated that in addition about 2 per cent of the antibody content of the defibrinated blood is lost in handling, by adherence to containers and otherwise. By comparison with the average recoveries and yields obtained by licensed establishments these figures have been found to be fair and essentially correct and are used as a basis for controlling commercial clear serum production. Since these

figures are a fair average, ordinary defibrinated blood serum may therefore be regarded as consisting of 65 per cent true serum, 25 per cent cells and 10 per cent phenol solution. Clear serum prepared from defibrinated blood, and therefore containing less clarifying solutions than when citrated whole blood is used, consists of 85 per cent true serum, 5 per cent clarifying solutions and 10 per cent phenol solution. When prepared from citrated blood it consists of from 80 to 83 per cent of true serum, from 7 to 10 per cent clarifying solutions, and 10 per cent phenol solution. If diluent is added to either class of clear serum, its composition, of course, depends upon the quantity of diluent added; but under Bureau requirements it never contains less than 65 per cent of true serum, or the quantity estimated as contained in ordinary defibrinated blood serum. As a matter of fact it usually consists of more than 65 per cent of true serum, 10 per cent of phenol solution, and about 25 per cent of clarifying and physiological salt solutions.

Producers are required to incorporate in trade labels a minimum dose table. This table in the case of concentrated clear serum recommends doses 20 per cent smaller than is required for either ordinary serum or diluted clear serum, provided the product contains not less than 80 per cent of true serum and does not represent over 78 per cent of the volume of ordinary serum that theoretically could have been prepared from the hyperimmune blood used in its production. This class of serum contains from 25 to 30.7 per cent more true serum per volume than does ordinary serum, whereas the field dose is an average of 20 per cent less than with either ordinary serum or diluted clear serum. To state the matter in another way, the field dose of ordinary serum and diluted clear serum is 25 per cent larger than it is with the concentrated class of clear serum, while its true serum content is from 18.75 to 22.5 per cent smaller. Making comparisons as to the volume of antibody content in field doses of serums on the market, we find that a 40 c.c. dose of ordinary serum contains 26 c.c. of true serum, and that a 32 c.c. dose of concentrated clear serum, which is 20 per cent less than the 40 c.c. dose of ordinary serum, contains 25.6 c.c. of true serum provided it consists of only 80 per cent of true serum. If it consists of 85 per cent of true serum, this 32 c.c. dose will con-

tain 27.2 c.c. of true serum, or more than is contained in the 40 c.c. dose of ordinary serum.

The diluted class of clear serum as prepared represents from 90 to 98 per cent of the volume of ordinary serum that theoretically could have been produced from the hyperimmune blood involved in its preparation. It must also contain as much true serum as a like volume of ordinary serum, but usually contains somewhat more, and the field dose required is identical with that of ordinary serum.

Characteristic Qualities of Clear Anti-Hog-Cholera Serum

The characteristic qualities of clear serum are :

1. The removal of the corpuscles of hyperimmune blood makes it possible to heat the serum recovered without material impairment of its protective value. This heating kills or renders innocuous the ordinary pathogens with which the product may be accidently contaminated and with which hogs and other animals may be affected. It also improves the keeping qualities of the serum by destroying putrefactive organisms.

2. The corpuscles are of proteid composition and, in effect, are foreign bodies difficult to preserve, and interfere with proper and rapid absorption of the product, and for these reasons may be responsible for abscesses or other forms of tissue destruction.

3. The fluidity of clear serum is increased by the elimination of the inert corpuscles and cell débris, thus facilitating its administration.

Before leaving this subject, I wish to utter a word of caution to those who may be inclined to administer the minimum dose of clear serum without due regard for existing conditions. The clarification of serum of course adds nothing to its antibody content, and liberal doses should therefore be given as in the case of ordinary serum. Not only are the herd conditions to be properly considered, but the conditions and circumstances existing with respect to each individual animal must be given due consideration if satisfactory results are to be obtained in either case. I want to say further that the value of ordinary defibrinated blood serum as you know has been established, therefore no one need hesitate to use it whenever it is indicated. However, clear serum has also established its merits, as shown by a

steady and healthy growth in the volume produced and used with satisfactory results. It has now been on the market for three or four years, but only in the past two seasons has it been prepared in sufficient volume to be subjected to a fair trial. Only in the last few months has it been prepared in a manner that could be expected to give the best results, but in the face of these facts I am pleased to report that very little authentic information has reached the Bureau of unfavorable results following its proper use.

ISSUANCE OF LICENSES

In conclusion I wish to deviate slightly from the main theme of my remarks and to state briefly the position of the Bureau in the matter of issuing licenses. It has been stated many times that the holding of a license by a person or firm is not to be taken as a guaranty by the Bureau of the products licensed. However, in spite of this there seems to be a feeling in some quarters that if a license is issued for a product by this act the Bureau guarantees it and is responsible for it. A guaranty by the Bureau of Animal Industry of any biologic product not prepared by it, even though it may be of unquestionable merit, would assuredly be a most absurd procedure. In the development of means for combating animal diseases we do not feel that our Bureau should be an organization of obstruction to progress; therefore when an application for a license is received covering a biologic product such a license is issued, provided, first, that the product is so prepared that it will not do injury to the livestock industry; second, that it is prepared in conformity with the best scientific thought and accepted immunologic principles; third, that it will be recommended for the prevention of the disease or condition from which the organisms or antigen used in its preparation were obtained. A license is not issued when a product fails to meet these requirements and when experimental or field tests show that it is unsatisfactory. The field for research regarding the immunologic value of a number of biologic products, however, is almost unlimited and in some degree unexplored. Bacteriotherapy is especially in need of more exhaustive study and investigational work to determine definitely what organisms or combination of organisms can be utilized best to produce products which will be uniformly

valuable. I am hopeful that scientific research will shortly point the way for the ultimate solution of many of the perplexing problems now encountered with regard to this class of biologics. In the meantime if progress can be made by supplementing the treatment of diseases or conditions with biologic products which seem to be indicated, particularly when other means fail or have their limitations, it seems logical to permit their production under safeguards which will insure that they will not be contaminated, dangerous or harmful. There is, however, a tendency in some quarters to resort to unwarranted methods for creating a demand for products of questionable value, but this procedure is of course both reprehensible and deplorable and in time must certainly react to the disadvantage of those employing it.

Let me suggest here that all recommendations regarding the use and efficacy of these products be given due consideration in all cases, and unless their scientific worth is definitely established by a long series of tests and observations that such comments as are made be properly qualified. A tremendous lot of empiricism still exists in the general application of biologics and in the dosage employed. It is therefore fitting that all who are interested in these products take cognizance thereof with the view of correcting these evils.

Further in this connection I want to say that I find nowhere in the literature any scientific basis for expecting favorable results from either bacteriotherapy or serum therapy unless the causative factor in the disease or condition to be prevented or treated is identical with the organism or organisms employed in the preparation of the products. All authorities are agreed that the action of these products is specific. Zinnser says: "To protest against the random use of commercial stock vaccines without laboratory diagnosis and without control is almost a platitude." It ought not to be necessary to remind men of scientific training of the imperative need for a correct diagnosis before applying bacterins and vaccines with any assurance that satisfactory results will be obtained. Biologics are not cure-alls. They are specifics.

We occasionally suspend and revoke licenses, and frequently destroy quantities of unsatisfactory products, but the value inherent to the livestock industry and the country in general in

licensing biologic products and in their proper preparation and control lies not alone in the number of firms denied a license nor in the number of licenses suspended or revoked, nor in the quantity of products destroyed, but primarily and chiefly in the moral influence which the activities and policy of the Bureau have upon licensed establishments and the production of their products. It is our primary aim and purpose to assist by all reasonable means in making available a supply of biologics which will not be contaminated, dangerous or harmful, and to use every proper means at our command to insure that these products will possess potency and worth commensurate with the most modern scientific knowledge of the subject of biologic therapy.

COMPARATIVE TABLES OF ANTI-HOG-CHOLERA SERUM

Ordinary Serum

100 c.c. defibrinated blood used

Defibrinated blood,	100 c.c.,	or	65 per cent true serum 25 per cent cells
Preserving solution,	11 c.c.,	or	10 per cent
Total	111 c.c.		100 per cent

Clear Serum (Bean-Salt Method)

100 c.c. defibrinated blood used

True serum	70 c.c.,	or	85 per cent
Bean extract and salt solution	4 c.c.,	or	5 per cent
Preserving solution	8.2 c.c.,	or	10 per cent
Total	82.2 c.c.		100 per cent

Clear Serum (Bean-Salt Plus Sodium Citrate Solution)

100 c.c. whole blood used

True serum	65 c.c.,	or	81 per cent
Citrate solution, bean extract and salt solution	7 c.c.,	or	9 per cent
Preserving solution	8 c.c.,	or	10 per cent
Total	80 c.c.,		100 per cent

Clear Serum (Diluted)

100 c.c. defibrinated blood used

True serum	70 c.c.,	or	65.42 per cent
Bean extract and salt solution	4 c.c.,	or	3.74 per cent
Preserving solution	10.7 c.c.,	or	10.00 per cent
Salt solution	22.3 c.c.,	or	20.84 per cent
Total	107.0 c.c.		100.00 per cent

DISCUSSION

DR. EICHHORN: As you have all seen from this very interesting paper, reference has been made to diluted serum, and since, in my mind, that involves deceiving the veterinary profession, I think a word or two should be said regarding this procedure. As you know, the ordinary clear serum represents the serum obtained from the hyperimmune blood, whereas the diluted clear serum has ordinary salt solution added to make up the volume. In the scientific process, in the production of this product, there is absolutely no excuse to dilute the serum, and while we have made wonderful progress as a result of the supervision in the manufacture of biologics by the B. A. I., it is really regrettable that any firm would think it desirable to dilute a serum.

DR. FITCH: In regard to the abortion bacterins, the statement was made that no product was licensed until it was proven that the product was not detrimental. I wish to state that I do not believe that it is yet a fact that the live abortion vaccines are not detrimental to the animal industry of the country.

BOVINE ABORTION

The growing importance of bovine infectious abortion, as a menacing factor in the livestock industry, lends interest to any discussion of the subject, particularly among veterinarians engaged in cattle practice.

In view of the fact that no uniformly successful treatment for the prevention and cure of this disease has yet been established, any reasonable plan intended to accomplish this purpose is worthy of careful consideration and trial by the veterinary profession.

The H. K. Mulford Company have recently issued a paper on this subject, in which they include a complete outline of a suggested plan of action for a veterinarian to follow in handling an infected herd. No extravagant claims are made for the treatment suggested, but an important feature of the plan is that it provides for gathering statistical evidence as to the real value of the plan and treatment in combating infectious abortion and increasing herd efficiency.

Veterinarians who are interested in this subject may obtain a copy of the paper referred to by writing to H. K. Mulford Company, Philadelphia, and mentioning this publication.

Drs. E. R. Stokwell and Albert Buck, neighboring practitioners in Ohio, recently passed through Washington, D. C., on an extended automobile tour through Florida.

THE EFFICIENCY OF CHLOROFORM AND THYMOL AGAINST HOOKWORMS IN THE SILVER-BLACK FOX

By J. A. ALLEN

Animal Pathologist, Fox Research Station, Health of Animals Branch, Canada

IN CANADA, particularly in the province of Prince Edward Island, the raising of silver-black foxes in captivity has become an important industry. Although Prince Edward Island is as yet regarded as the center of this growing business, foxes are now being bred in confinement in other provinces of Canada, the United States, Japan and some European countries.

During 1920 there were over 2,000 live foxes exported from the Island. The approximate value of this foundation stock and the pelts marketed that year is said to be $1,400,000. This sum exceeds the revenue derived from all other classes of livestock in this small province, which has a population of less than 100,000 people.

Since the industry is comparatively new, it would be expected that fox ranchers would experience some pathological difficulties in their attempt to keep in small inclosures a wild animal that was accustomed to roam over a wide territory. The writer was assigned in 1919 by Dr. F. Torrance, Veterinary Director General, to make a general survey of fox ranches and to study some of these problems. Our findings were outlined in a previous communication (1).

During this investigation we were surprised to find that a large percentage of the carcasses examined harbored hookworms (*Uncinaria polaris*, Loos). The further data obtained since the establishment of the Fox Research Station clearly indicate that hookworm infestation is steadily spreading. This of course is the result of the increasing traffic in foxes.

ECONOMIC IMPORTANCE OF HOOKWORM INFESTATION IN FOXES

It is the experience of practical fox farmers that a much larger percentage of foxes are now developing undesirable tex-

[1] Published by permission of Dr. F. Torrance, Veterinary Director General, and Dr. E. A. Watson, Chief Animal Pathologist.

ture and color. There are two of these conditions that have given fox breeders much concern: (1) Woolliness. As the name implies, the fur loses its silky texture, feels much like wool, and the long hair—guard hair—does not grow to the required length. (2) Rust—a condition in which the fur takes on a reddish or brownish hue instead of the deep, glossy blue-black color that characterizes a prime pelt. There is not a very ready market for such skins, and they are always sold at a greatly reduced price.

There has been much speculation as to the cause of woolly fur. Among the theories advanced to account for it are malnutrition, iodine deficiency and transmission of hereditary characters. Since our calling attention to the prevalence of hookworms, a number of experienced ranchers have the opinion that these parasites have an etiological significance. These men argue that in former years they had no trouble, and that in some cases an animal showing good fur quality one year may develop woolliness later in life.

There is evidence for the support of most of these theories. In one experiment in which we mated three pairs of distinctly woolly foxes the parents gave birth to woolly progeny. It has been claimed that good results have been obtained by the feeding of potassium iodide. The available data would indicate that possibly all these factors are operative.

All "off furred" foxes do not show hookworm infestation, but it seems significant that over 68 per cent of the woolly and stunted animals used in our present experiment harbored hookworms. However, some of these experimental animals had only a few worms, and in this case their presence may have had little significance. In order to account for the inimical influence on the fur when only a few parasites are present, one would have to postulate an analogous condition, as observed in ascaridiosis, in which foxes become insusceptible to infestation when they reach adult age, and that animals in which early infestation occurs do not always recover after the influence of the parasite is withdrawn. There are cases on record where woolliness appeared to be purely transitory, and still other cases where it seemed to be a permanent hereditary character.

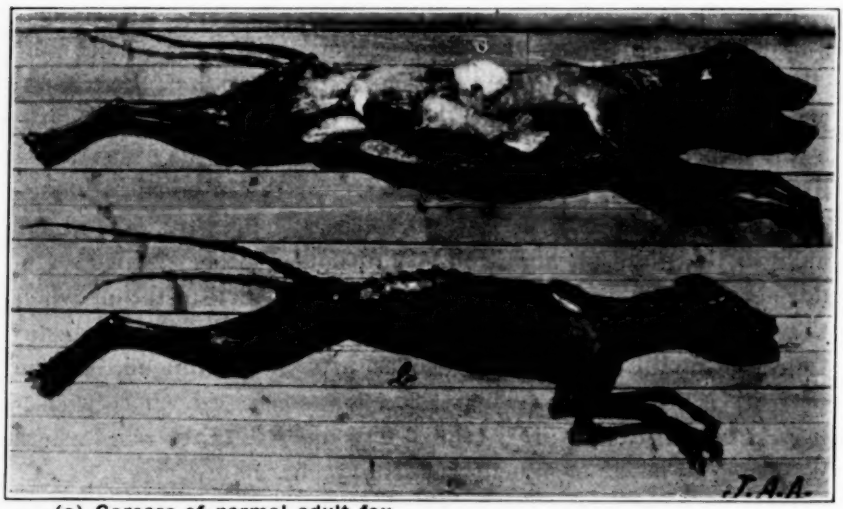
It is our experience that where there is a large number of uncinaria present there is always a poor quality of fur. This

merely follows the general rule in hookworm disease, for in man or animals the condition of the hair or coat is taken as a diagnostic symptom. In giving the symptoms of hookworm disease in man, Stiles (4) describes the hair as follows: "The hair of the head is dry, reminding one of hemp. The beard, axillary and pubic hairs may be very late and scant of growth."

Stiles (4) also notes that if severe infection occurs in early childhood, puberty may be delayed for several years. Although we have no experimental data concerning the relationship of uncinariasis and unfruitful matings in foxes, it is suggestive that many of the ranchers in whose animals hookworms were found report a low yield which they attribute to impotence and sterility.

Only a comparatively small number of foxes succumb to the disease, i. e., only a small number of carcasses reach us in which the number of parasites found justifies our concluding that the hookworm was the sole cause of death. In heavily infested carcasses a marked edema of nearly all tissues, pronounced emaciation, and inflammatory areas in the alimentary canal are the most constant postmortem finding. In such cases the hookworm is the primary etiological factor.

We have pointed out before (1) that the alimentary system is the most vulnerable part of the black fox's economy; and it is



(a) Carcass of normal adult fox.
(b) Carcass of fox about same age as (a), heavily infested with hookworms. Note emaciation and retardation of growth.

quite conceivable that the occurrence of some of the gastro-intestinal lesions during the summer months is the result of hookworms making a portal for infection. It may be stated without qualification that hookworms in foxes predispose to other diseases.

While the problem is largely one of sanitation, it is very necessary to find an effective remedy for the removal of these parasites before undertaking the work of eradication. The drugs which gave most promise, as shown by accurately checked experiments in dogs and clinical observation in man, were chloroform and thymol.

TECHNIQUE

The only really accurate method of experimentally determining the efficiency of any anthelmintic is to recover the worms from the feces after treatment and then kill the animal to ascertain the number of worms still retained. By this method the results may be expressed in terms of a percentage. Comparatively few experiments of this kind have ben conducted. The most noteworthy were published by Hall and Foster (2).

The value of most animals precludes such experiments on a scale large enough to give conclusive evidence. This is particularly true of experimentation on silver foxes that cost from $300 to $1,200. The only time that such work can be undertaken is during the pelting season, December to January, and even then it is difficult to secure material because the owners fear that the fur may become injured by the handling and close confinement when the animals are under observation. Ordinarily only the prime animals are killed for their pelts, since the poorly furred fox has little market value; and when foxes do not fur out properly, as is the case in heavy hookworm infestation, they are usually held over in the hope that the fur may be of better quality at a subsequent pelting season. For our experiments we were fortunate in securing some animals that were being eliminated by their owners because of inferior fur quality.

In these experiments the metric system was used. The weight of the animals is expressed in kilos (a kilo equals 2.2 pounds) and the dosage is expressed in mils (a mil equals about 15 minims). The animals were fasted from 12 to 24 hours before treatment. In the experiments with chloroform the drug was

administered in doses of castor oil varying from 25 to 35 mils according to weight.

There is a slight inaccuracy in the doses of chloroform given in the text. This is due to the fact that foxes resent the administration of medicine, particularly liquid ones, and some is lost when dosing.

In the experiments with thymol the drug was given in capsule, and the animals received a purgative before and after the anthelmintic. Magnesium sulphate was given as a preliminary purgative. From one to two cathartic pills, according to size of animal, were given one or two hours after the anthelmintic. Because of the inaccuracy noted above in giving liquid medicine, the administration of a pill was, we considered, a surer and safer method of eliminating the thymol and preventing absorption.

During the experiment the animals were confined in shipping crates, the feces were collected and carefully washed and the number of worms expelled were counted. Each animal was tagged with a number which it kept until the time of making the postmortem examination, when the number of worms that still retained was ascertained.

EXPERIMENTS WITH CHLOROFORM

Experiment No. 1

Five foxes varying in weight from 3.5 kilos to 6 kilos were given chloroform in castor oil at the rate of 0.2 mil per kilo of body weight.

Fox No. 26 passed 1 ascarid but no hookworms. When killed five days later was found to have retained 1 hookworm. Efficiency against ascarids, 100 per cent; against hookworms, 0 per cent. A few slight petechiæ found in stomach and intestines.

Fox No. 27 passed no worms; died inside 40 hours after administration. No worms found on postmortem. Hemorrhage in stomach; abdominal cavity full of blood.

Fox No. 28 passed no worms; none found on postmortem. Petechiæ in stomach.

Fox No. 29 passed one ascarid; died in 24 hours. Postmortem revealed the presence of 15 hookworms and catarrahal inflammation of stomach. Efficiency against hookworms, 0 per cent.

Fox No. 30 passed no hookworms, but had 5 fixed to bowel when killed five days later. A few petechiæ found in stomach and intestines. Efficiency against hookworms, 0 per cent.

Chloroform, administered in quantities usually recommended for dogs, killed two out of five experimental animals; and what is still more surprising, it failed to remove any of the hookworms present. It removed the only two ascarids in the five experimental foxes, but the number present was so small that the figure can not be accepted as an index of efficiency.

Experiment No. 2

In experiment No. 1, 0.2 mil of chloroform failed to remove any of the hookworms present. In this experiment five foxes were given 0.4 mil per kilo of body weight.

Red Fox No. 31 showed intoxication shortly after receiving medicine. During the 24 hours following treatment passed 1 ascarid and 4 hookworms. When killed five days later the animal still harbored 13 ascarids and 30 hookworms. Efficiency against ascarids, 7 per cent; against hookworms, 13.3 per cent.

Fox No. 32 passed no worms and none were found on postmortem. Animal died in 50 hours. Stomach, intestines and abdominal cavity full of blood.

Fox No. 33 died in 50 hours. Passed no worms; none found on postmortem. Examination showed petechiæ in stomach and intestines and catarrahal inflammation of stomach.

Fox No. 34 died in 40 hours, after much straining and vomiting. No worms passed and none found on postmortem. Stomach and abdominal cavity full of blood.

Fox No. 35 passed 27 hookworms; had 43 hookworms when killed three days later; showed petechiæ in stomach and intestines. Efficiency against hookworms, 38 per cent.

Experiment No. 3

In this experiment, chloroform was given at the rate of 0.1 mil per kilo of body weight. This is one-half of the quantity usually recommended for dogs.

Fox No. 36 weighed 5.5 kilos. This animal passed 1 hookworm and had 2 worms adhering to bowel when killed six days later. Carcass in good condition. Efficiency against hookworms, 33.3 per cent.

Fox No. 37, weighing 6 kilos, was given chloroform as above and died in 24 hours. Lesions typical. This animal passed much feces before death but no hookworms; 22 hookworms were still attached to the bowel. Efficiency against hookworms, 0 per cent.

Experiment No. 4

Hermann's mixture has been strongly advocated as an anthelmintic against hookworms. In his experiments in the treat-

ment of dogs, Hall (2) found that the mixture owed its anthelmintic value to its chloroform content. In the two dogs treated with combination he succeeded in removing 75 per cent of the hookworms present. This appeared to be a suitable remedy to recommend to fox ranchers, and its use has been suggested by the writer purely on the basis of analogy. Due warning has always been given that only one-half of the usual dose be used, and that untoward results might ensue.

According to the published formula, Hermann's mixture has the following constituents: Chloroform, 3 grams; castor oil, 40 grams; oil of eucalyptus, 2 grams, or oleoresin of male fern, 4 grams; i.e., the mixture should include either eucalyptus or male fern. Owing to an error, Hall included both drugs and apparently found no disadvantage in doing so. In our experiments we followed Hall's unintentional modification of the original formula because of the high efficiency it gave in his experiment with dogs.

Since our experimental material on which we had the advantage of postmortem examination was limited, and in view of our previous experience with chloroform, only two foxes were used in this series.

Fox No. 38, weighing 5.6 kilos, was given the full amount of Hermann's mixture, which was divided into three equal doses and administered inside of two hours on an empty stomach. This is the method recommended for dogs. The chloroform content here exceeded that found capable of killing foxes, so the death of the animal after manifesting severe symptoms of enteritis and general intoxication was fully anticipated. The animal passed no worms and none were found on postmortem.

Fox No. 39 was given only one-half the quantity of the mixture. The animal became depressed shortly after administration, showed bloody stool, and passed no hookworms. When killed four days later, hemorrhagic areas and 2 hookworms were found in the intestines. Efficiency against hookworms, 0 per cent.

Discussion of Results Obtained with Chloroform

Combining the results of all four experiments, it is found that chloroform removed only 21 per cent of the hookworms harbored by the 14 experimental foxes. This is an unexpected result and is quite at variance with that obtained with chloroform in dogs. Hall (3) found that 0.1 mil per kilo of body

weight was inefficient; but when used on the basis of 0.2 or 0.3 mil per kilo an efficiency of 50 per cent could be expected, which, he states, is better than single doses of either thymol or santonin.

The lethality of chloroform is much more pronounced for foxes than it is for dogs. Two out of five foxes receiving 0.2 mil, three out of five receiving 0.4 mil, and one out of the two foxes receiving 0.1 mil per kilo of body weight died from the effects of the drug. The total mortality in the four experiments was 50 per cent. Hall (3) found that normal dogs could withstand doses as great as 3.65 mils per kilo given at one dose, and 5 mils per kilo when the dose was divided and administered on successive days. He found that choloroform was safer than thymol.

These quotations are offered in support of the writer's previous observation in regard to the apparent idiosyncrasies of silver-black foxes. This intolerance to chloroform is not only demonstrated in the oral administration of the drug. In the early days of the fox industry, when the animals were valued at from $20,000 to $30,000 a pair, surgical operations were often performed by physicians, who naturally employed chloroform as an anesthetic. Deaths follow so frequently that it is now considered safer to forego an operation rather than administer chloroform.

EXPERIMENTS WITH THYMOL

Experiment No. 5

Foxes Nos. 40, 41, 42 and 43, with preliminary and subsequent purging, were given thymol at the rate of 0.13 gram per kilo of body weight. The animals varied in weight from 4 to 6 kilos, and were in good physical condition. These foxes are grouped together because all were free from hookworms, and were in good condition when killed four days later.

Experiment No. 6

Foxes Nos. 44 to 59, inclusive. These 16 foxes were given thymol at the rate of 0.13 gram per kilo of body weight, and in two hours this dose was repeated. Eleven of the foxes were found to harbor hookworms in numbers varying from 5 to 250. In all there were 650 hookworms expelled and 90 retained after treatment, giving an efficiency of 87.8 per cent. The animals weighed from 3 to 7 kilos. The treatment was 100 per cent efficient in 7 out of the 11 infested foxes. Three of the 16 ex-

perimental animals died from the effects of the drug in from three to five days. The mortality with this dosage is, therefore, 18.7 per cent.

Experiment No. 7

Fox No. 60, weighing 3.5 kilos, was given thymol at the rate of 0.065 gram per kilo of body weight. The dose was repeated at the end of two hours. During the 24 hours after treatment 11 hookworms were passed; none present on postmortem. Efficiency against hookworms, 100 per cent.

Fox No. 61, treated similarly to No. 60, was found to be free from worms.

Fox No. 62 during treatment passed 1 hookworm and retained 2 worms. Efficiency 33.3. per cent.

The number of worms present in these animals is entirely too small, and no valid conclusion can be drawn from the experiment. The owner of a ranch on which infestation was found to be very heavy volunteered to place his animals at our disposal. One hundred and sixty foxes were treated with 5-grain doses, repeated in two hours, which was approximately on the same basis as in experiment No. 7. Many hookworms were expelled, but the efficiency of the treatment could not, of course, be determined by postmortem examination. Out of the 160 foxes, 11, or 6.8 per cent, died as a result of the treatment. Two of these animals showed unmistakable evidence of mechanical pneumonia as a result of getting the magnesium sulphate solution down the trachea.

Experiment No. 8

In this experiment six foxes received only one dose on the basis of 0.065 gram of thymol per kilo of body weight.

Fox No. 63 passed no hookworms and retained 6.
Fox No. 64 passed 4 hookworms and retained 4.
Fox No. 65 passed no hookworms and retained 11.
Fox No. 66 passed no hookworms and retained none.
Fox No. 67 passed no hookworms and retained 2.
Fox No. 68 passed no hookworms and retained 14.

Experiment No. 9

Fox No. 69 on December 13 received oil of chenopodium at the rate 0.2 mil per kilo of body weight, and passed 13 ascarids and 3 hookworms. On December 17 the same animal received thymol at the rate of 0.13 gram per kilo; dose repeated in two hours; passed 41 hookworms. When killed four days later it still had retained 6 hookworms. Chenopodium was 100 per cent

efficient against ascarids and 6 per cent efficient against hookworms, while thymol gave an efficiency of 82 per cent against hookworms.

Fox No. 70 on December 13 received chloroform at the rate of 0.2 mil per kilo. No worms expelled. On December 17 received thymol, 0.13 mil per kilo, and expelled 5 hookworms. Chloroform showed an efficiency of 0 per cent against hookworms, while thymol gave an efficiency of 100 per cent.

Fox No. 71 treated similarly to No. 70, showed an efficiency of 33 per cent for choloroform and an efficiency of 60 per cent for thymol.

Discussion of Results Obtained With Thymol

The results obtained in Experiment No. 6 show that thymol has a very high efficiency when given in doses of 0.13 gram per kilo of body weight, but the mortality from this dosage is too high for practical and indiscriminate administration. In some special cases, however, where the infestation is rampant, it might be justifiable to use this maximum dose, which would equal about 20 grains given in two doses for the average fox, in order to eradicate the parasite. This would doubtless be the less costly procedure in the end. The work of eradication could be withheld until late fall when the pelts are reaching primeness, so that the animals succumbing to the treatment would not be an absolute loss.

Although the number of animals included in Experiment No. 7 is too small on which to base an opinion, it appears that at least a 33 per cent efficiency may be expected from this dosage, which equals about 10 grams given in two doses at two-hour intervals for the average sized fox. This is supported by results reported in the treatment of 160 animals. With this dosage the mortality is reduced to about 6.8 per cent, which is not high considering the tenaciousness of the parasite, the usual debilitated condition of heavily infested hosts, and the potency that an anthelmintic substance must have in order to be efficient.

Experiment No. 8 shows that a dosage of 0.065 gram per kilo—approximately 5 grains for the average sized fox—is below the threshold of an effective quantity of thymol. Only one out of the six foxes which received this dosage passed hookworms.

Thymol is much more effective against hookworms than either chenopodium or chloroform. In the same animal chenopodium

gave only a 6 per cent efficiency, while thymol gave an 82 per cent efficiency, as shown in experiment No. 9. Chenopodium gave a high index against ascarids (*Belascaris marginata*). In the same experiment chloroform was very ineffective, removing none of the worms, while a subsequent dose of thymol expelled all the hookworms present.

SUMMARY

1. All poorly furred foxes do not harbor hookworms, but 68 per cent of the woolly and stunted foxes used in these experiments had hookworms. Uncinaria undoubtedly influence the fur when the parasite is present in large numbers.

2. Chloroform is inefficient as an anthelmintic against hookworms in foxes. It is also a dangerous drug, producing a mortality of 50 per cent in the present experiments.

3. Thymol showed a high degree of efficiency (87.8 per cent) when given to foxes on the basis of 0.13 gram per kilo of body weight, with this dose repeated in two hours. From this dosage a mortality of 18.7 per cent followed, which makes it rather dangerous for universal application unless a heroic attempt at eradication is necessary in ranches where infestation is heavy.

4. When thymol is used on the basis of 0.065 gram per kilo of live weight and the dose repeated in two hours, an efficiency of at least 33 per cent may be expected, and the mortality is reduced to about 6.8 per cent.

5. One dose of 0.065 gram of thymol per kilo of body weight has little or no anthelmintic effect.

6. Thymol is more effective and less dangerous than chloroform as an anthelmintic against hookworms in the silver-black fox.

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MAMMITIS [1]

By JOHN F. MCKENNA, *Fresno, California*

OF THE NUMEROUS udder conditions in cows, mammitis is by far the most important and is a condition which gives the practicing veterinarian considerable trouble at many times.

In preparing this paper the writer had in mind that perhaps a great many practitioners would be present and a general discussion following the paper would be conducive of more good than anything that might be brought out in the paper itself. A few years ago a paper was presented on this subject by the writer at one of the State association meetings. At the Short Course for Veterinarians, held at Pullman, Washington, last January, he had the privilege of presenting this subject, and from his observations at both these meetings it is apparent that the general practitioners are eager to exchange views on this subject and particularly as to treatment.

Literature containing real information on this subject is somewhat meager in spite of the fact that some text-books are published on mammitis and other udder conditions, particularly of cows.

I have read the late articles published by Mark Stephens, John L. Tyler and S. L. Stewart, also the articles by J. A. Capp and B. J. Davis and numerous others, but the studies in bovine mammitis by F. S. Jones of the Rockefeller Institute are perhaps the most complete of their kind ever published.

TWO FORMS OF MAMMITIS

A number of articles which have been presented on this subject tend toward the theory that all causes of mammitis are of microbian origin. For several years I have advanced the theory that the two most common forms of mammitis are (1) sporadic and (2) true infectious mammitis.

I believe that 80 per cent of all cases of mammitis can be classed as sporadic. By sporadic I mean that form of mammitis due to a change in the condition of the udder which might take place from within or without the body. Under this class can be named such causes as traumatism of any form,

[1] Presented at the California Practitioners' Week, Davis, California, January 3 to 8, 1921.

pressure, cold, exposure, extreme heat, extreme cold, constipation, intestinal disturbances, or sudden change of any kind. Now I do not mean to convey the impression that the various forms of organism usually found in the udder do not play some part in this form of mammitis, but I do contend that these organisms as a rule only do harm after the resistance of the udder has been lowered by one or more of the conditions which I have mentioned, and that the organisms which are present are not able to induce the disease without the help of the initiative causative factor, and furthermore, that the number of bacteria that some writers have described as the initiative cause of mammitis were found in the affected gland or glands by virtue of their presence in the normal udder.

Jones, in his reprint from the *Journal of Experimental Medicine,* both in the studies of bovine mastitis and also on the source and significance of streptococci in market milk, gives in detail a summary of the examination of milk drawn directly from the udders. The milk was always drawn directly into a sterile wide-mouth bottle. The cows were brushed, washed and dried before the samples were drawn. The first few streams were discarded and samples from each quarter were milked into the same bottle. The milk was iced at once and usually plated within an hour. Of 16 cows which were eliminating streptococci in the milk, mammitis developed clinically in three cows during a period from March until June. Five other cows suffered from mammitis during lactation period, and the other eight of the sixteen never showed any sign of mammitis during the period of experimentation.

In our general practice we have on numerous occasions seen single cases of mammitis in large herds where milkers have milked the animal suffering from mammitis and then gone to milk other cows in the same herd without taking any precautions in reference to their soiled hands, and yet no other cases of the disease have developed in the herd. In my opinion in these cases if the organism which was given off in the secretions from the case of mammitis was virulent enough to be the initiative causative factor, then surely other animals in the herd would become infected under these insanitary milking conditions.

That form of mammitis which the writer classifies as true infectious mammitis is the form in which an organism or a group

of organisms are the initiative causative factor and are virulent enough to transmit the disease from animal to animal or to produce the disease without the aid of some agent which will lower the resistance of the udder. According to the works of Herzog, Moore, Nocard, Bang and others, a variety of micro-organisms are responsible in producing a true infectious mammitis.

The clinical symptoms of both the forms of mammitis referred to are too well known for me to go into detail. However, it will be well at this time to take up a few differential diagnostic points. Sporadic mammitis is most commonly found in cows that are heavy milkers, whereas in true infectious mammitis in a herd this does not seem to hold good. In sporadic mammitis the temperature of the animal varies from a degree to 2 or 3 degrees above normal, whereas in true infectious mammitis there is always a high temperature varying from 3 to 5 or 6 degrees above normal. In sporadic mammitis many times only one quarter is affected, whereas in true infectious mammitis two or more quarters are usually involved. In true infectious mammitis there is pronounced loss of appetite and a general depression, whereas in sopradic mammitis this condition but rarely occurs.

TREATMENT

It has fallen to our lot to treat a great number of cows suffering from inflammation or infections of the udder, and from our practical experience we believe that we have gained a better understanding of the treatment of these conditions as each year has gone by. However, our local treatment has remained practically the same during the past eight or nine years. It consists of hot water applications several times daily, and this can be applied best by the use of heavy cloth made into suspensory bandages. The hot water should be at a temperature which will permit one's hands to handle it with comfort.

We have tried many of the salves and ointments and special preparations which are on the market for use in cases of mammitis, but after trying them all the writer is of the opinion that olive oil 10 parts and therapogen 1 part gives us an ideal mammitis oil.

Apply the hot water and then massage the udder with the

oil, which should be done at least three times daily, but five or six times daily is preferable. The quarter should be milked at each massage.

Internally, laxatives are to be used as indicated. Drastic purgatives are not to be used. Fluid extract of echinacea may be given in 1-ounce doses four times daily, and where this is not practicable, 2-ounce doses may be given twice daily. We believe the drug echinacea is preferable to many of the other agents that have been recommended for this condition, such as phytolacca, potassium iodide, formalin, formaldehyde, or DeVine's formula, which consists of hyposulphite of soda 16 ounces, powdered nux vomica 2 ounces, ginger 4 ounces, licorice 4 ounces, given in 2-ounce doses three times a day.

Echinacea in the writer's hands has been able to produce any of the results that could be expected from the above-mentioned remedies, and its theraputic properties reach farther than all of them. This drug actively opposes septic tendencies, stimulates the glandular organs and actively enforces secretions and excretions of the lymphatic system.

Subcutaneously our treatment has been very varied. Starting with the use of nuclein solution, we used this product on all cases of mammitis in 1911, 1912 and 1913. In 1914 we discarded nuclein for lymph-gland extract, and during 1914 and 1915 and 1916 we used this extract on all cases of mammitis, with results far better than when we were using nuclein, our local treatment and internal medication being the same as when we were using the nuclein solution.

In 1917 we carried on an experimentation on 100 cases of mammitis, using the same local treatment, the same internal medication, and in place of either nuclein or lymph-gland extract resorted to subcutaneous injections of milk drawn from the affected udder. The affected quarter or quarters were milked into a graduate, and where the secretions were too thick to allow them to be drawn into a hypodermic syringe, milk from one of the other quarters was added to put the contents in solution. This solution was drawn into a large hypodermic syringe and from 40 to 80 c.c. injected subcutaneously into the animal. Careful records were kept on approximately 100 cases. We repeated the injection of secretion in from 48 to 72 hours. This line of subcutaneous treatment gave us even better results than we had been receiving by the use of either

nuclein or gland extract. The same local and internal treatment was carried on as before mentioned. However, we were not entirely satisfied with the method of administration, principally for the reason that the clients at all times were not entirely satisfied with our methods. About the time that we had completed the 100 cases that we speak of, one of the biologic concerns placed on the market a serobacterin. We discarded the use of the milk injections in favor of the serobacterin and used this serobacterin for several months. At the end of this time another biologic concern put on the market two mammitis or mastitis bacterins, one a streptococcus mastitis bacterin (bovine) prepared from killed cultures of hemolytic and non-hemolytic types of streptococci isolated from cases of mammitis in dairy herds, the other a mixed mastitis bacterin (bovine) prepared from polyvalent killed cultures of streptococci 60 per cent, *Bacillus pyogenes* 25 per cent, staphylococci 10 per cent, *B. coli* 5 per cent. These products are highly recommended by the manufacturer both from a curative and prophylactic standpoint. They recommend the use of straight streptococcus bacterin in the acute cases and the mixed in the chronic cases. In the last year in our practice we have used these two products for subcutaneous treatment in preference to the others mentioned; however, we have not discarded in any way our local treatment or internal medication.

We do not agree with the manufacturers of the bacterin that most cases of mammitis are of microbian origin and that the majority of cases are due to an invasion of either the hemolytic or non-hemolytic types of streptococci, but believe that the benefit which we derived from either of the milk secretions as previously outlined or from the mammitis bacterins which are now on the market is due to the fact that in the sporadic cases of mammitis the organisms found in the udder are producing a destructive condition due only to the fact that the tissues have been made a favorable medium by some systemic disturbance or traumatic condition, and that the use of the bacterins is indicated only for the reason of building up resistance power, and that little or no good would be accomplished through their use without the aid of the local treatment and medicinal agents.

SUMMARY OF TREATMENT

Frequent hot water applications.

Frequent elimination of secretions from the affected quarter or quarters.

Frequent massaging with olive oil 10 parts and 1 part of therapogen.

Echinacea in 1 to 2 ounce doses two to four times daily.

Laxatives as indicated.

The use of bacterins as an adjuvant to the local and internal treatment.

Prof. W. Herbert Lowe has just completed the Short Course in Agriculture at Rutgers College, New Jersey. He was chosen by his class to make the address in their behalf at the graduation exercises. As Professor of Animal Husbandry and Industry at New York State Veterinary College, New York University, Dr. Lowe is leaving no stone unturned to acquire the latest knowledge on scientific agriculture for the benefit of his students.

Dr. W. L. Williams, Mrs. Williams and their daughter arrived safely in Ithaca the fore part of February. Dr. Williams has spent about a year in the Hawaiian Islands, and reports a most interesting and glorious time. He again took up his work in the New York State Veterinary College, Cornell University, on February 14.

In a beautifully illustrated New Year's edition, the Pasadena *Evening Post* shows the most interesting features of the Carnival of Roses. Among these is an excellent picture of Dr. W. A. Boucher, Chief Marshal of the parade.

Doctor Boucher is one of the leading veterinarians of Southern California and has taken an active interest in civic affairs.

Captain E. A. Watson, Chief Animal Pathologist in the Canadian Department of Agriculture, has just issued a most interesting and well illustrated bulletin on dourine in Canada. The report includes a review and summary of papers and records published in the annual reports of the Veterinary Director General for the years 1904 to 1919, a general description of the disease and a number of appendices.

TUBERCULOSIS IN MILK GOATS

By G. E. GOLDEN

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SOME CASES of tuberculosis in milk goats which recently came under the writer's observation will no doubt be of interest not only to the veterinarian but to the public at large on account of the previous supposition of the relative freedom of goats from tuberculosis.

An imported herd of Saanen and Toggenburg goats which arrived in this country from Switzerland March 3, 1920, was recently found badly infected with tuberculosis on a farm near Sioux City, Iowa, in the vicinity of Leeds, Iowa. The trip from Switzerland to the quarantine station at Athenia, N. J., consumed about five months. After being in quarantine about eighty-five days the animals arrived at their destination at Leeds, Iowa, the trip being made by express.

On account of some diseased condition in this herd which failed to respond to treatment by the local veterinarian, two live goats were shipped to Dr. Murray, Experiment Station, Ames, Iowa, for experimental purposes. Dr. Murray reported the finding of tuberculous lesions in one of the goats on postmortem examination.

On November 30, 1920, I applied the intradermic tuberculin test to the herd, which included 33 imported does, 8 imported bucks and 1 native doe. Seventy-two hours later observations revealed 6 well-marked positive reactors.

On December 6 an ophthalmic disc was instilled into the left eye of each goat. At 8 p. m. December 8 all goats with the exception of bucks and the native doe were given a subcutaneous injection of tuberculin. Goats which had previously reacted to the intradermic test were given 3 c.c. and the remainder 2 c.c. Post temperatures were taken four hours after injection and continued every two hours until 2 p. m. December 9.

On December 9 at 8 a. m., a second ophthalmic disc was instilled into the left eye of each goat except goat No. 2, which had died in the meantime. Observations were made three hours later and continued every hour until 3 p. m. All six goats

which had previously reacted to the intradermic test gave a positive reaction to the ophthalmic test.

Three of the six reactors to the ophthalmic and intradermic tests gave a positive reaction (thermal) to the subcutaneous test. One goat died seven hours subsequent to injection, with a subnormal temperature, the remaining two goats showing a decided rise in temperature.

An autopsy conducted on goat No. 2, which died seven hours subsequent to inoculation, revealed the following postmortem lesions: Extensive caseo-calcareous bronchial and mediastinal lymph glands, also well-marked caseo-calcareous lesions in the lungs.

On December 10 these tuberculous lesions were sent to Dr. Morse in charge of the Government Laboratory at Omaha, where a miscroscopic examination of the tissues revealed acid-fast rods in smears made from caseo-calcareous material of lungs and glands.

On account of the importance of this case it was deemed advisable to forward these tissues to the Pathological Division, Bureau of Animal Industry, Washington, D. C., for further examination. A microscopic examination of these tissues at Washington also revealed the presence of acid-fast microörganisms. An emulsion of the diseased areas was then made and injected into guinea-pigs. These animals became noticeably ill, but were allowed to live until the twenty-fifth day after inoculation, when one of the pigs was killed and well advanced lesions of tuberculosis were found in the prepectoral lymph glands, peritoneum, liver, spleen, and the lymph gland in close proximity to the site of inoculation. On the peritoneum the tubercles were studded over its whole surface.

On December 24 autopsies were made on reactor goats Nos. 92, 22, 39 and 104, and the following tuberculous lesions were found:

Goat No. 92.—Bronchial lymph gland, well-marked caseo-calcareous condition.

Goat No. 22.—Posterior mediastinal lyph gland, well-marked caseo-calcareous condition. A few caseo-calcareous nodules in both lungs. Bronchial lymph gland, slightly caseo-calcareous.

Goat No. 39.—Posterior mediastinal lymph gland, extensively caseous. Small caseo-calcareous nodules in both lungs. Well-marked caseo-calcareous nodules in spleen.

Goat No. 104.—Anterior and posterior lymph glands, extensively caseo-calcareous. Bronchial lymph gland, extensively caseo-calcareous. Anterior half of left lung caseo-calcareous, also small caseo-calcareous nodules throughout remainder of both lungs. Well-marked caseo-calcareous nodules in spleen and liver.

A part of the tuberculous tissues from goat No. 104 were sent to the Government Laboratory at Omaha, Nebr., where microscopic examination demonstrated tubercle bacilli in smears made from caseo-calcareous lesions in liver, lungs and gland.

Diseased tissues from goats No. 92, 22, 39 and 104 were sent to the Pathological Laboratory, Washington, where a microscopic examination demonstrated acid-fast organisms of the size and form of tubercle bacilli in the lesions present.

Reactor goat No. 105 was shipped to Ames, Iowa, for a clinic held in connection with the Veterinary Practitioners' Short Course, January 17 and 18. This animal was retested on the 17th and 18th at Ames and gave a positive reaction to both the ophthalmic and subcutaneous tests. The goat was then killed and well-marked caseo-calcareous tuberculous lesions were found in the lungs and mediastinal lymph glands.

The original source of this infection has not as yet been ascertained. The goats have not associated with other animals since their arrival at Leeds. Very few cattle or hogs are kept on the farm. The yards and buildings are in very good sanitary condition, the latter being recently built.

In view of the extensive tuberculosis infection in this herd of milk goats, it is the opinion of the writer that the safest method to pursue in order to prevent the spread of tuberculosis to the human family from this source would be either to pasteurize the milk or to test the goats with tuberculin and remove reactors. From the well-marked positive reactions that the tuberculous goats gave to the different tuberculin tests it is apparent that the testing of goats for tuberculosis can be done with accuracy. Goats may be badly affected with tuberculosis and still appear in good physical condition, as was the case with three of the tuberculous goats in this herd.

TUBERCULOSIS OF GOATS

By CHARLES MURRAY, S. H. MCNUTT *and* PAUL PURWIN

Department of Veterinary Investigation, Iowa State College, Ames, Iowa

THE GOAT has long been considered highly refractory to tuberculosis infection, a supposition based on limited observation and experimentation. Due to the fact that the goat has not been extensively slaughtered at supervised slaughterhouses, accurate records over any considerable period of time are not available upon which to determine the extent of the disease in this animal. On the basis of the assumption that the goat is rarely tuberculous, the substitution of goat milk for cow milk has been extensively made as a prophylactic measure against human tuberculosis.

The fact is that tuberculosis in goats is not nearly so rare as has been thought, and the false security felt by those using goat milk because of the belief that there is no possibility of the transmission of tuberculosis is a dangerous thing. While it will have to be admitted from the evidence at hand that the disease is probably far less prevalent among goats than among cattle, nevertheless its occurrence must be recognized and a warning should be sounded, and physicians who have given unqualified recommendation concerning the use of goat milk as a product wholly free from tuberculosis infection should bear in mind the possibility of the transmission of the disease through that agent.

A review of the foreign literature shows that in inspected abattoirs recognition of the disease is not uncommon. Fröhner and Zwick report that at the slaughterhouses in Lyons for the year 1899 3,000 goats were slaughtered of which 7 were tuberculous. At the same place in 1904-1906 the percentage was 0.72. In Bavaria the percentage of tuberculous goats of those slaughtered under government inspection was: For 1904, 0.14; for 1906, 0.19. In Saxony the percentages were: 1898, 0.41; 1900, 2.57; 1902, 2.97; 1904, 1.83; 1906, 1.99; 1908, 1.96. In Prussia: 1898, 0.50; 1900, 0.38; 1902, 0.35; 1904, 0.51; 1906, 0.61.

In the United States last year, according to the reports of the Bureau of Animal Industry, there were slaughtered in abattoirs

under Government inspection an average of nearly 4,000 goats per month, but we are unable to obtain the percentage of these that showed tuberculosis.[1]

M. Schlegel in his report of the director of the Veterinary Hygienic Institute of Freiberg for 1917 says: "Tuberculous processes in goats assume a different aspect from those of other animals, tending to a high degree of caseation, calcification and encapsulation. Large areas of lung parenchyma are destroyed with formation of caseous, encapsulated nodules appearing in the form of soft cavernous abscesses inclosed by a thick fibrous wall. The capsule is a thick, smooth, fibrous wall and the contents often a yellowish green, cheesy material, the whole resembling the nodule of the cysticercus, the wall being readily separated from the surrounding tissue." He reports three cases autopsied at the laboratory, two being primary lung tuberculosis, the other a generalized condition.

Mathis and Leblanc observed, in a goat four years of age, emaciation, coarse cough, accelerated and labored breathing, bloody mucous discharge from the nose, bronchial breathing and rales upon auscultation of the lungs, and pericardial friction sounds. Edgar described a similar case. Hess observed loss of appetite, frequent moist, short, painful cough, abdominal respiration, rapid decrease in flow of milk, but normal temperature throughout. Schroeder observed in a goat with well-developed pulmonary tuberculosis that the udder was also affected and transformed into a nodulated, painless tumor the size of a man's head and hard as a stone. Rabieux and Leclerc observed miliary udder tuberculosis. Nocard saw a similar case. Karlinski isolated the human type tubercle bacterium from the udder of an affected goat. Sluys and Korevaar describe one case of a goat raised on cow's milk showing all the symptoms of pulmonary tuberculosis, which on autopsy proved to be a generalized case with primary lesions in the intestines. Magin found in a goat slaughtered in the Munich abattoir a generalized infection including the intervertebral discs, in which were pea-sized nodules of caseous material in the parenchyma of the lungs, liver, spleen, and peritoneal and pleural cavities. Bulling found cavernous formation in the lungs, as did also Probst.

[1] The report of the Chief of the Bureau of Animal Industry for the fiscal year ended June 30, 1920, shows no condemnation for tuberculosis among the 77,270 goats slaughtered under the Federal meat inspection.—EDITOR.

In May, 1920, a firm importing Swiss milk goats received a shipment from Europe in which they experienced some loss. This shipment on the trip over was held about ninety days in Martinique, and again in quarantine about the same length of time at Athenia, New Jersey. In the course of some investigations to determine the cause of the losses that the firm was sustaining there were found in one goat some calcified nodules in the bronchial lymph glands. These had the gross appearance of tuberculous glands, and microscopic examination of smears revealed characteristic acid-fast organisms. Two guinea-pigs were devitalized by exposure to X-rays for five minutes and were then inoculated with the macerated glandular tissue November 9, 1920. On November 26, 1920, the enlarged inguinal lymph gland of one of these pigs was removed, and direct smears from this, as well as sections, showed many organisms of tuberculosis. December 1 this pig was destroyed and tuberculous lesions were found in the liver and mediastinal lymph glands. December 10 the second guinea-pig was autopsied and showed generalized tuberculosis.

Report of the finding of tuberculosis in this goat was made to the owners, with the suggestion that the flock be tuberculin tested. This was done by the Federal Department of Agriculture about Christmas time, and six reactors were found, making eight known tuberculous animals in the flock. One of these was shipped to this department for demonstration before the Practitioners' Conference, and was retested January 17 and 18 by the ophthalmic and subcutaneous methods, reacting markedly to both, showing a 3.6° rise in temperature, a marked systemic reaction and a characteristic purulent discharge from the eye. On autopsy this goat showed tuberculous lesions in the lungs, the mediastinal and bronchial lymph glands, the liver and the spleen. The nodules in the lungs, liver and spleen were caseo-calcareous, those of the lymph glands calcified. The lungs showed the cavernous lesions surrounded by a thick, fibrous, white wall similar to that described by the observers quoted above, and the contents were yellowish green and caseous. Both of the goats autopsied in this laboratory were emaciated but were at the same time suffering from another condition (takosis) which was accountable for their appearance, as other goats in the same flock which showed no tuberculous lesions were as badly emaciated as these two.

COCCIDIA AS A CAUSE OF QUAIL DISEASE

By B. A. GALLAGHER

Pathological Division, Bureau of Animal Industry, Washington, D. C.

IN 1907 Morse described an infectious disease of American quail which he found was caused by a form of *Bacillus coli*. To this disease he gave the name "quail disease."

Symptoms.—The symptoms shown by affected birds are dullness, lack of appetite and roughness of the plumage. Death occurs within two or three days after the appearance of symptoms. In chronic cases emaciation is extreme.

Postmortem Appearance.—On autopsy the carcass usually is in good condition. The lungs may be slightly congested. The liver is congested and in most cases shows necrotic areas. The spleen also is congested. The most characteristic lesions are numerous small, yellowish areas of necrosis in the wall of the intestine. These areas average about the size of a pinhead and may be seen through the peritoneal surface. The necrotic ulcers sometimes perforate the intestinal wall.

Quail disease is observed principally among various species of quail captured in Mexico and shipped to the United States for stocking game preserves. Thousands of these birds are imported annually during the winter, and the unusual conditions and hardships endured in transit and through the period of quarantine apparently predispose them to the disease.

In miscroscopic examinations of intestinal contents of quail forwarded to the Pathological Division of the Bureau of Animal Industry from ports of entry and from game preserves, coccidia were frequently found in large numbers. In some cases the postmortem lesions were similar to those of acute coccidiosis in chickens and accordingly warranted a diagnosis of intestinal coccidiosis. In other cases birds showing coccidia in the intestinal contents also displayed the characteristic lesions of quail disease. The question arose as to whether the coccidia might bear a causative relation to these lesions, since it is well known that these organisms develop a large part of their life cycle within mucous and liver tissues.

Doubt that the *B. coli* organism was always responsible for quail disease was entertained by the writer because of the fact that in many typical cases the colon bacillus could not be isolated from the heart blood or lungs, although usually present in the liver. The presence of the colon bacillus in a necrotic liver could well be expected, since the organism, normally present in the intestines, could easily pass through the bile ducts and find a favorable place for growth in necrotic areas; also colon organisms may enter the liver shortly after death and develop profusely. Morse, though giving a form of *B. coli* as the causative agent, states that "the bacillus can not always be cultivated from the heart blood of a bird dead of quail disease, nor can it always be cultivated from the lungs. It can usually be isolated from the liver in which lesions exist, and always from the affected intestines."

Microscopic Examination.—That the coccidia did bear a relation to the development of necrotic lesions of the intestines and liver has been demonstrated by microscopic studies of sections of diseased tissues and of fresh diseased material broken up in potassium hydroxid solution. Numerous coccidial forms in several stages of development were observed in the necrotic material and degenerating tissues in both the intestinal and liver lesions.

EXPERIMENTS

An opportunity occurred last spring to test the infectiousness of both the bacillus and the coccidium, isolated from typical cases of quail disease, on several quail which were received from Texas for experimental purposes. These were from a Mexican importation and were kept at the Bureau Experiment Station near Washington for a period of two months without showing evidence of disease.

Experiment 1.—One quail received subcutaneously 1 c.c. of a 48-hour bouillon culture of a newly isolated colon organism from a case of quail disease, one quail received 1 c.c. of the same culture intra-abdominally, and one quail was fed 1 c.c. of the same culture.

The birds receiving the subcutaneous and intra-abdominal injections failed to disclose evidence of infection. The one receiving the culture per os became sick shortly afterwards, no

doubt as a result of the toxin formed in the culture medium. This bird remained dull, droopy and "bunched up," and was found dead on the morning of the seventh day after the culture was administered. On autopsy no lesions of quail disease were found, but *B. coli* was isolated from the liver. The heart blood and lungs were sterile. No coccidia were found in the intestinal contents.

About a month after the experiment described was completed several quail carcasses showing characteristic lesions of quail disease were received from Virginia. These birds had recently arrived from Mexico. Coccidia were extremely numerous in the intestines and were found also in the liver lesions. *B. coli* was isolated from the liver, but was not found in the heart blood or lungs.

Experiment 2.—The two quail which survived the previous experiment with the *B. coli* and one other quail from the same lot were allowed to drink water in which the intestinal contents of one of the diseased Virginia quail were mixed. Twelve days later one bird was found dead. The autopsy revealed numerous small, well-marked necrotic areas in the intestines and ceca. The liver contained two large necrotic areas. Microscopic examination showed that coccidia were numerous in the intestine and present in the liver lesions. Several colonies of a colonlike organism were isolated from the liver and lungs. The heart blood was sterile.

June 1, 1920, the second quail was found dead. The autopsy disclosed well-marked lesions of quail disease in liver and intestine. Coccidia were present in the liver and intestine. *B. coli* was isolated from the liver only.

The third quail remained alive. Whether it contracted the disease and recovered or was naturally resistant was not determined.

CONCLUSIONS

It appears to be evident, as a result of the foregoing study of quail disease, that the coccidium must be considered as a causative agent. This evidence is supported by the fact that lesions of a similar necrotic nature are found in coccidial and other protozoan infections, such as coccidiosis of the liver of rabbits and young chicks and enterohepatitis of turkeys.

The experiments, while not sufficiently numerous to warrant elimination of the colon bacillus as another causative factor, showed that quail disease could be induced by allowing birds to consume material containing coccidia, whereas the injection or feeding of *B. coli* isolated from a case of quail disease failed to reproduce the disease.

The finding of *B. coli* outside the intestinal tract and especially in the liver of birds dead of quail disease is not of sufficient weight to give it primary etiological importance. This is particularly true in view of the absence of experimental proof that *B. coli* is capable in itself of inducing a case of this disease.

REFERENCES

MORSE, GEO. BYRON. Quail Disease in the United States. Bureau of Animal Industry Circular 109. 1907.

WARD, ARCHIBALD ROBINSON, and GALLAGHER, B. A. Diseases of Domesticated Birds. 1920.

Dr. F. D. Owen, in charge of the Bureau of Animal Industry's coöperative hog cholera work in North Carolina, has fully recovered from a series of operations performed in December, the operations being for appendicitis, gall stones, right and left inguinal hernias, and the removal of a tumor from his arm.

The *Star-Bulletin* of Honolulu for February 14, 1921, announces the arrival of the transport *Thomas*, with Colonel William G. Turner of the Veterinary Corps listed among the through passengers for Manila.

Dr. J. M. Kerr has recently accepted a position with the North Carolina Department of Agriculture and is engaged in coöperative tick eradication work.

Dr. Chas. W. Bandy, Assistant State Veterinarian of Illinois, has recently moved to Harvel, Illinois, where he will engage in general practice.

President D. S. White is a proud and happy grandfather. THE JOURNAL extends congratulations.

HEMORRHAGIC SEPTICEMIA AND ITS CONTROL, WITH SPECIAL REFERENCE TO THE NEBRASKA EXPERIMENTS

By ADOLPH EICHHORN, *Pearl River, New York*

IN A COMMUNICATION to the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION (vol. 11, p. 241), the writer pointed out the shortcomings of Nebraska Research Bulletins 17 and 18 on "The Immunizing Value of Commercial Vaccines and Bacterins Against Hemorrhagic Septicemia," by L. Van Es and H. M. Martin. No effort was made at that time to review these publications and it was intended only to point out their incompleteness as works of research. In view of the fact that the authors have deemed it advisable to make an effort to defend the various criticisms (JOURNAL A. V. M. A., vol. 11, p. 572) by what appears to be a very faint attempt, it is deemed advisable to give further consideration to these publications.

The significance of the subject and the tremendous amount of investigations carried out on this disease are of sufficient importance to place before the profession such facts as will conclusively prove the erroneous contentions of the authors of these bulletins, which, if not refuted, may not only leave a wrong impression as to the present status of immunization against hemorrhagic septicemia, but might also reflect upon those who dare to take issue with the authors.

Anyone engaged in research work and accustomed to preparing the results of such work for publication could not help but note at the first glance the incompleteness of the two bulletins to which reference was made. In the first communication we pointed out some of the shortcomings, which the writers aimed to correct by some amplification of the original work and also by quotations from literature. Unfortunately only such quotations were utilized as favored the authors' contentions; all others were considered inconsequential, and many important ones on the subject were entirely omitted.

It is noted that the authors interpreted the language of Hutyra and Marek with reference to Lignières's work as being only lukewarm, claiming that the vaccine (Lignières) is only "supposed" to immunize against hemorrhagic septicemia. If, however, we read the entire chapter on immunization of hem-

orrhagic septicemia in Hutyra and Marek we note the following introductory paragraph:

> "Pasteur proved that cultures of the chicken cholera organism when attenuated by keeping in the air produce a suitable vaccine for the immunization of chickens against artificial infection. Similar results are obtained with cultures attenuated by higher temperature or by disinfectants."

In the 1920 German edition of Hutyra and Marek we find favorable comments on immunization against the various forms of hemorrhagic septicemia and particularly so the following statement for chicken cholera: "An effective method has been developed for the active and passive immunization against hemorrhagic septicemia."

In the Handbook on Serum Therapy and Diagnosis by Klimmer and Wolff Eisner we find on page 209 the following statement: "It has been experimentally established that by injecting large animals repeatedly with cultures of hemorrhagic septicemia a serum is produced which not only has a protective action but to a certain degree also a curative action." In the same paragraph it is also stated: "It has also been established that it is possible to immunize animals against hemorrhagic septicemia by injecting them with sterile exudates and sterile extracts of bacilli."

It is not deemed necessary to mention the numerous individual authors who have expressed themselves as having obtained satisfactory results with attenuated cultures, killed organisms and bacterial extracts in hemorrhagic septicemia, some of them in laboratory tests, others again in field cases. However, the writer is unable to state whether the particular authors in the field who used any of these products have followed Van Es and Martin's suggestion, namely, that field results can only be of any use if sufficient checks are provided; that is, if half of the animals are treated and the other half are not treated. We can not see how practicing veterinarians could carry out any form of vaccination in the field according to the suggestions of the authors.

Furthermore, we note that on page 576, in the third paragraph, the authors state that the number of useful immunizing agents is indeed quite small and that the value of these has always been proven by well controlled laboratory experiments or field trials, whereas on page 581, in discussing Kitt's result

with the products, they state: "In many instances did he secure immune animals, but his writings show nowhere that the results of his labors had developed beyond the laboratory stage." It is peculiar that in the first instance Van Es and Martin desire to prove the effectiveness of the products by laboratory experiments, whereas in the second instance they fail to accept them because nothing but laboratory experience substantiates the results.

With reference to the vaccination of the buffaloes in the Yellowstone National Park, as reported by Mohler and Eichhorn, it is noted that the vaccination had taken place a considerable time after the appearance of the disease. Revaccination of this herd was undertaken annually for several years, and the reason why this first vaccination was not undertaken at an earlier date was that after the isolation of the hemorrhagic septicemia organisms experimental work was undertaken on rabbits and sheep, and only after these experiments proved the effectiveness of the vaccination was the vaccine supplied for the immunization of the buffaloes. Our experimental work proved that rabbits and even sheep were protected against an established dose of virulent cultures, the infective dose having proved fatal to control animals. Complement fixation tests were also conducted on these vaccinated animals and the presence of antibodies was readily determined in increasing quantity. These various preliminary scientific experiments were purposely left out of the paper presented before the United States Livestock Sanitary Association because it was simply intended to point out in a practical manner the possibility of protecting animals against hemorrhagic septicemia.

In turning our attention to the "Research Bulletins" we again have to repeat that it is surprising that the authors failed to give due consideration to the minimum lethal dose. If for no other reason, as research men, they should have been curious enough to make an effort to find out whether there is any immunity produced by the injection of the products they used. It is true that they aimed to correct that in their subsequent publication in this JOURNAL, at the same time also making references to the inconsequence of determining the smallest infective dose. This, however, is rather amazing, as we must consider that practically in all protective vaccination there

is a limit to the immunity produced in the animals, and of course no one can tell what the relative protection afforded by such a limited artificial immunity is in case of natural exposure. We realize that there are some exceptions to this, as, for instance, in animals vaccinated against hog cholera.

The numerous tables contained in Bulletins 17 and 18 on the immunizing value show a more or less uniform failure of protection against hemorrhagic septicemia in the immunized animals. We have conducted similar tests with hemorrhagic septicemia vaccine (bovine) and hemorrhagic septicemia vaccine (swine). The results of these, however, do not in the least coincide with those of Van Es and Martin. We will not make any effort to explain this apparent discrepancy, but it might be advisable to call attention to the fact that in every test we were careful to establish the lethal dose of the culture which we used for the infection of the immunized animals, as indicated in Table 1.

Tables 1 and 2 show plainly that the product possesses immunizing properties, but they also show that a single injection will not afford the animals as strong an immunity as will repeated injections. At any rate, in interpreting these tables we must acknowledge the possibility of conferring an immunity to rabbits by vaccination. In the face of these results we can not explain the apparent failures of protection as given by Van Es and Martin.

In the introductory remark of Bulletin 17 Van Es and Martin stated that in those instances where the vaccine or bacterin infection produced immediate unfavorable effects, such as indisposition or even sudden death immediately following the injection, they attributed the deaths entirely to the presence of preservative agents. It is hoped that they did not conduct all of the work in their experiments in such a loose way as this statement is made. Those who are familiar with the amount of preservative which is contained in 2, 4, or even 10 c.c. of vaccine, and who know the amount of preservative which may be safely injected into rabbits, must realize that the statement is absolutely erroneous. In the preparation of viruses and sera the amount of preservative which enters into the different products does not exceed 0.5 per cent phenol, with the possible exception of hog cholera virus, which at one time was pre-

Table 1. – Immunization Test of Hemorrhagic Septicemia Vaccine

IMMUNIZING VACCINE INJECTIONS				LIVE CULTURE INJECTION OF *B. bipolaris*	RESULTS
RABBIT No.	DEC. 14, 1920 2 c.c.	DEC. 20, 1920 3 c.c.	DEC. 27, 1920 4 c.c.	JAN 4, 1921 1 c.c. 1–2,000 DILUTION	
1	x	x	x	x	Lived
2	x	x	x	x	do.
3	x	x	x	x	do.
4	x	x	x	x	do.
5	x	x	x	x	do.
6	x	x	x	x	do.
7	.....	x	x	x	do.
8	.....	x	x	x	Died Jan. 9, 1921
9	.....	x	x	x	Lived
10	.....	x	x	x	do.
11	.....	x	x	x	do.
12	.....	x	x	x	do.
13	.....	.....	x	x	Died Jan. 7, 1921
14	.....	.....	x	x	Died Jan. 6, 1921
15	.....	.....	x	x	Died Jan. 13, 1921
16	.....	.....	x	x	Lived
17	.....	.....	x	x	Died Jan. 6, 1921
18	.....	.....	x	x	Died Jan. 7, 1921
19	Control.	.....	.....	x	Died Jan. 5, 1921
20	.....do.	.....	.....	x	Died Jan. 6, 1921
21	.....do.	.....	.....	x	Died Jan. 6, 1921
22	.....do.	.....	.....	x	Died Jan. 6, 1921
	DETERMINATION OF LETHAL DOSE[1]			DEC. 30, 1920, 1 C.C. OF 24-HOUR BROTH CULTURE. DILUTIONS:	
1	.....			1–2,000	Died Jan. 1, 1921
2	.....			1–4,000	Died Jan. 1, 1921
3	.....			1–6,000	Died Jan. 1, 1921
4	.....			1–8,000	Died Jan. 1, 1921
5	.....			1–10,000	Lived
6	.....			1–10,000	do.

[1] Similar tests were made for the determination of the lethal dose in connection with the tests given in the other tables. In the above tests as well as in Table 2 about five times the lethal dose was injected into the immunized rabbits.

Table 2.—Immunization Test of Hemorrhagic Septicemia Vaccine

Immunizing Vaccine Injections				Live Culture Injection of *B. bipolaris*	Results
Rabbit No.	Oct. 25, 1920 2 c.c.	Oct. 30, 1920 3 c.c.	Nov. 8, 1920 4 c.c.	Nov. 18, 1920 1 c.c. 1-2,000 dilution	
1	x	x	x	1 c.c.	Lived
2	x	x	x	x	do.
3	x	x	x	x	do.
4	x	x	x	x	do.
5	x	x	x	x	Died Nov. 26, 1920
6	x	x	x	x	Lived
7	.....	x	x	x	Died Nov. 22, 1920
8	.....	x	x	x	do.
9	.....	x	x	x	Lived.
10	.....	x	x	x	do.
11	.....	x	x	x	do.
12	.....	x	x	x	do.
13	.....	.....	x	x	do.
14	.....	.....	x	x	do.
15	.....	.....	x	x	do.
16	.....	.....	x	x	Died Nov. 20, 1920
17	.....	.....	x	x	Lived
18	.....	.....	x	x	do.
19	Control	.....	.....	x	Died Nov. 19, 1920
20	do.	.....	.....	x	do.
21	do.	.....	.....	x	Died Nov. 20, 1920
22	do.	.....	.....	x	Lived

served with 1 per cent phenol. One-half of 1 per cent of phenol in 10 c.c. or even higher doses would not have any ill effect on rabbits and surely would not cause sudden death as claimed by the authors.

In the introductory remark of the same bulletin the following statement is made:

> "Aside from a rather transitory and very unstable immunity secured by the use of an anti-serum prepared by us, there was little or no evidence that injections of bacterins or vaccines, as made in our laboratory, were followed by any degree of resistance against a trial injection of *B. bipolaris*."

Furthermore, a similar statement was made by Van Es at the Veterinary Conference held in January at Urbana, Illinois. We must again express our great surprise, yes, a disappointment, that the authors failed in producing an immune serum,

Table 3.—Protective Value of Hemorrhagic Septicemia Serum in a Horse Undergoing Hyperimmunizing Treatment

RABBIT NO.	HORSE NO.	DATE BLED	AMOUNT SERUM	DATE INJECTED	VIRUS INJECTED, 0.002 c.c.[1]	RESULTS
1	2168	3/ 3/19	5 c.c.	3/ 5/19	3/ 7/19	Died Mar. 11, 4 days
2	2168	do	5 c.c.	do.	do.	Died Mar. 9, 2 days
3	.....	.....	5 c.c. normal serum	do.	do.	Died Mar. 8, 18 hours
4	2168	3/30/19	5 c.c.	3/31/19	4/ 2/19	Lived
5	2168	do	5 c.c.	do.	do.	Died Apr. 7, 5 days
6	.....	.....	5 c.c. normal serum	do.	do.	Died Apr. 3, 24 hours
7	2168	4/15/19	5 c.c.	4/16/19	4/18/19	Lived
8	2168	do	5 c.c.	do.	do.	do.
9	.....	.....	5 c.c. normal serum	do.	do.	Died Apr. 19, 24 hours

[1]Received 0.002 c.c. of 24-hour broth culture (500 lethal doses.)

which would even in large doses protect animals against many fatal doses of culture.

Every one who is familiar with the immunizing experiments conducted against the various forms of hemorrhagic septicemia is aware of the fact that many investigators have produced highly effective immune sera against hemorrhagic septicemia. It seems, therefore, that there must have been some factor responsible for such contradictory results. The writer has been engaged in the production of anti-hemorrhagic septicemia serum for many years, and to prove our point it might be of interest to publish some of our potency test charts on the protective value of hemorrhagic septicemia serums.

Table 3 is of particular interest because it shows plainly how, with the increased amount of injection of cultures, the protective value of the serum is increased.

The protection tests of the serums were conducted in our laboratory on both rabbits and mice. As we find on repeated testing that mice are at least as well suited as rabbits for the protection test, we are now conducting our routine tests on mice. Such protection tests are carried out at regular intervals on the serum-producing horses, and therefore the utilization of mice in an establishment engaged in the production of large quantities of immune serums is an economical advantage.

Serums tested as shown in the foregoing tables were from horses injected with *Bacillus suisepticus* and some with *B. bovisepticus*. The protection in the test animals is rather re-

Table 4.—Protection Tests of Hemorrhagic Septicemia Serum

Mouse No.	Horse No.	Date bled	Amount Serum injected	Date injected	Live Culture injection of *B. bipolaris*	Date injected	Results
1	1163	9/18/20	0.2 c.c.	9/22/20	0.002 c.c.[1]	9/23/20	Lived
2	1163	do.	0.4 c.c.	do.	do.	do.	do.
3	1163	do.	0.6 c.c.	do.	do.	do.	do.
4	1163	do.	0.8 c.c.	do.	do.	do.	do.
5	2338	do.	0.2 c.c.	do.	do.	do.	Died Sept. 29, 6 days
6	2338	do.	0.4 c.c.	do.	do.	do.	Lived
7	2338	do.	0.6 c.c.	do.	do.	do.	do.
8	2338	do.	0.8 c.c.	do.	do	do.	do.
9	2460	do.	0.2 c.c.	do.	do.	do.	Died Sept. 29, 6 days
10	2460	do.	0.4 c.c.	do.	do.	do.	Lived
11	2460	do.	0.6 c.c.	do.	do.	do.	do.
12	2460	do.	0.8 c.c.	do.	do.	do.	do.
13	Control	.....	.....	.....	do.	do.	Died Sept. 24, 24 hours
14	do.	.....	.....	.....	do.	do.	Died Sept. 25, 36 hours
15	do.	.....	.....	.....	do.	do.	Died Sept. 25, 36 hours
16	do.	.....	.....	.....	do.	do.	Died Sept. 24, 24 hours
17	1163	1/6/21	0.2 c.c.	1/7/21	0.001 c.c.[2]	1/8/21	Lived
18	1163	do.	0.4 c.c.	do.	do.	do.	do.
19	1163	do.	0.6 c.c.	do.	do.	do.	do.
20	1163	do.	0.8 c.c.	do.	do.	do.	do.
21	2460	do.	0.2 c.c.	do.	do.	do.	do.
22	2460	do.	0.4 c.c.	do.	do.	do.	do.
23	2460	do.	0.6 c.c.	do.	do.	do.	do.
24	2460	do.	0.8 c.c.	do.	do.	do.	do.
25	2470	do.	0.2 c.c.	do.	do.	do.	do.
26	2470	do.	0.4 c.c.	do.	do.	do.	do.
27	2470	do.	0.6 c.c.	do.	do.	do.	do.
28	2470	do.	0.8 c.c.	do.	do.	do.	do.
29	Control	.....	.....	do.	do.	do.	Died Jan. 10, 36 hours
30	do.	.....	.....	do.	do.	do.	do.
31	do.	.....	.....	do.	do.	do.	do.
32	do.	.....	.....	do.	do.	do.	do.

[1] 0.002 c.c.=500 lethal doses for mouse.
[2] 0.001 c.c.=250 lethal doses for mouse.

markable and clearly points out the possiblity of producing an immune serum of very high potency in animals with cultures of these organisms. It is not deemed necessary to dwell at length upon the production of a serum with *B. avisepticus* as this has been repeatedly and conclusively proved by investigators in various countries. It would require considerable space to mention the names of all who have published articles on the production of an effective serum against chicken cholera.

From the foregoing tests and the voluminous literature it is evident that the possibility of immunizing against hemorrhagic septicemia has been proved. It is realized that the essential feature for successful immunization of animals in the field de-

pends to a great extent on the correct diagnosis and further on the use of the product when indicated. There is no doubt that in a large number of cases a diagnosis of hemorrhagic septicemia is made, when some other cause is responsible for the losses in animals. This applies more particularly to the group of diseases designated as hemorrhagic septicemia than any other disease. The condition is probably due to the fact that veterinarians are prone to accept the presence of various forms of hemorrhage as lesions of hemorrhagic septicemia caused by the bipolar organisms, whereas we should recognize the fact that such lesions may originate from many other causes.

It is not the writer's intention to make absolute claims for the effectiveness of hemorrhagic septicemia vaccines. While we realize that for hemorrhagic septicemia serum we have conclusive evidence to prove its protective value, nevertheless we also have evidence as to the value of vaccines. The tables published above, likewise the literature citations in the different publications, furnish proof of the possibility of protecting animals with killed cultures.

Furthermore we can not lose sight of the fact that field experiences with biological products must also be given due consideration. At the present time we do not know in many of the diseases the degree of immunity which is essential to protect the animals against the natural exposure. In some infections it might be possible to confer upon the animals a moderate degree of immunity which nevertheless would protect them against the natural exposure. Therefore it would be erroneous to disregard entirely any degree of immunity unless the animals would resist tremendous infective doses. Yet this is practically the contention of Van Es and Martin when they say that they "were not concerned with minimum lethal doses as long as it is a well-known fact that really immune animals withstand doses of *Bacillus bipolaris* of enormous virulence." We can not see the logic of Van Es and Martin in these contentions. How do they know that an animal which they consider as "really immune" does not possess a degree of immunity that would resist natural exposure?

If such "real immunity" would be expected in all diseases for which we immunize the animals, biological therapy could not have been developed to the present state. For instance, anthrax vaccination has been established as a desirable means

of protecting animals against anthrax whether the double vaccination or simultaneous vaccination is used, but every one who has been engaged in the study of anthrax immunization knows the fact that immunized animals will withstand the injection of only very small amounts of virulent material. Yet in the face of that we also know that immunized animals are protected against the natural infection. While failures of protection are being observed from time to time, destructive outbreaks among immunized animals are unknown, and it is considered that vaccination against anthrax protects hundreds of thousands of animals annually throughout the world.

The study of the application of biological products is by no means yet perfected for all infectious diseases. Yet even in those instances where the experimental work has not yet justified definite claims for a product, authorities in medical science are making use of them. The writer wishes to refer to the use of tuberculin for curative purposes in tuberculosis of man. In almost every country this product is being used more and more extensively for the treatment of certain cases of tuberculosis. Yet laboratory men have never as yet definitely established the curative value of the tuberculins on test animals. In the face of this it is remarkable that great medical authorities on this disease and men engaged in the treatment of the disease in sanitariums should use the product and report favorable results from it.

In conclusion it might be of interest to state that products for the control of hemorrhagic septicemia in the form of immune sera, bacterial extract and vaccines are being prepared commercially not only by laboratories in the United States but also in most of the foreign countries by laboratories having the highest reputation. Some of these laboratories are even government institutions. It appears reasonable to assume that they had some definite foundation to justify the distribution of these products.

The principles of biological therapeutics are proved correct; when we are confronted with partial or even total failure it is almost invariably due to the fact that our knowledge is neither complete nor final, and only by broadening our knowledge with *constructive* work can we hope to develop their greatest usefulness.

HEMORRHAGIC SEPTICEMIA VACCINES OR BACTERINS

By WALTER E. KING

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IN A RECENT issue of the JOURNAL appeared an article by Van Es and Martin (1) in which reference was made to certain published criticisms (2) of bulletins (3) from the Agricultural Experiment Station of Nebraska on the immunizing value of hemorrhagic septicemia vaccines. The tenor of this article and some of the statements contained therein require refutation. There is no desire on the part of the present writer to be inveigled into a personal controversy in the columns of the JOURNAL or elsewhere. It is our distinct purpose to avoid such a procedure, regardless of the fact that the authors of the article to which reference is made apparently undertook to mix matters of science with questions of personal honesty. In this article the writer is not concerned with an attempt to defend personal reputation, native ability, methods of work or choice of employers.

Turning to the article in question (JOUR. A. V. M. A., Feb., 1921, p. 572) the attention of the reader is directed to certain paragraphs as follows:

"In another publication by Hadley (6), which, by the way, conveniently escaped review by the critic King (22), this author states in his summary: 'Resistance in rabbits to ten billion times the minimum lethal dose of a very virulent culture has been artifically produced by a single large dose (3 c.c.) of the homologous culture.' Mack and Records (24), whose work is also approved and highly commended by the same critic, in a series of experiments did not consider it wrong to use test doses of from 1 to 4 c.c., while in other series the dose of 1 c.c. was given.

"It is strange that with those facts, mostly quoted from authors who apparently enjoy the confidence of King (22) and whose writings he actually pretends to review, so much fault should be found with the doses used by Van Es and Martin, etc. When King (22) encountered those latter smaller doses he deemed it wise to withhold the facts from his readers.

"It may further be instructive to refer briefly to at least one part of Mack and Record's publication which one critic (22) who professes to review this work entirely withheld from his readers. That part refers to the attempts of Mack and Records to immunize rabbits and fowls by means of the use of bacterins. For the details of

those experiments we refer the reader to the original, which, no doubt, can yet be obtained from the experiment station concerned or which can be found on the shelves of many libraries. As in the experiments of other authors, a number of animals survived the virus injections, yet in their final summary Mack and Records state that 'the injection of from one to three doses of bacterin failed to produce immunity in chickens sufficiently to enable them to withstand subsequent inoculation with virulent cultures.' Why the critic (22) does not review this part of the work of Mack and Records he does not reveal."

It is to be regretted that more space was not available for the article in which criticisms of Research Bulletins 17 and 18 were ventured, in order that the data offered in the work of Hadley and Mack and Records should have received more detailed review. However, the claim is made that in the brief space allowed at least as much fairness was exercised as is shown in the article in question. Proof of this statement may be had by the following quotations from the criticism (*No. Amer. Vet.*, Oct., 1920, pp. 341, 342):

"Hadley, discussing virus or cultures used in his extensive experiments, states as follows:

" 'It may here be said that rabbits, which had been successfully immunized with living cultures were often able to tolerate at least 2 c.c. of virulent culture 48 when the M. L. D. was 0.000,000,001 c.c.

" 'Mack and Records, Bulletin 85, December, 1916, Nevada State Experiment Station, Tables 2-7, show the results of their work in determining the minimum lethal dose of different strains of *B. avisepticus* for rabbits and fowl.

" 'We have found no strain which could be depended upon to kill even a fair percentage of chickens when administered orally, either in the form of cultures or fresh tissue emulsions from chickens dead of the disease. The lack of such a strain has greatly hampered experimental work on immunity as it has necessitated testing immunity by means of subcutaneous or intramuscular inoculation, which is not comparable with natural exposure and to resist which requires a much higher degree of immunity, than is needed to protect against natural infection..

" 'One rabbit was successfully immunized by the subcutaneous administration of bacterin. This method failed to immunize chickens against subsequent subcutaneous or intramuscular inoculation, although no more than three injections of bacterin were tried.' "

Unfortunately, the entire articles of Hadley and that of Mack and Records could not be quoted and dilated upon, nor for the sake of fairness was it necessary. Such quotations as occurred were correct and presented fair, logical argument. By way of comparing methods used in the two articles, excepting personal references which need not be considered, attention of the reader is directed to the following paragraph (JOUR. A. V. M. A., p. 573, paragraph 5):

"The reference made by some of the critics to the testing and use of antidiphtheritic and antitetanic serum has no bearing on this case. We scarcely need to point out that toxin and antitoxin unite in definite proportions and the former will always kill when in excess. In antibacterial immunity the modus operandi is entirely different."

Assuming that so far as antitoxic serums and specific toxins are concerned there exist no data bearing on the case, why do the authors overlook the argumentative illustration contained in the critical review which was stated as follows:

"Cattle protected by adequate doses of blackleg aggressin may be successfully infected with blackleg by the hypodermic injection of overwhelming doses of virus."

Proof of the foregoing statement may be found by referring to the tabulated results of inoculation tests on cattle in an article by Shigley (4) on the control of blackleg.

It can not be denied that this phenomenon has a distinct bearing on this case and calls for discussion if the real point at issue is to receive impartial consideration. Before leaving the quotation above it may be mentioned that there remain some unsolved questions regarding toxin antitoxin mixtures, as shown by McClintock and Ferry (5), Kretz (6), Miller (7), Atkinson (8), Babes (9) and Smith (10).

Again returning to the recent article, the following statements are found (page 577, paragraph 3):

"Continuing his critical offensive, King (22) further charges that in Experiments V, VI, VII, VIII and XI second injections of virus were given to surviving animals after the controls had died, for the evident purpose of not letting a bacterin-treated animal get by. We fear that the critic King (22) is taking some liberties with the truth in two of the instances he mentions and that he severely bends it his way in the others. The truth is that Tables V and VI show most clearly that no second injections were made. Table VII shows that a second injection was made because the first virus injection failed to kill the controls, although it killed a number of the presumably immune rabbits."

The reader is requested to examine the original Tables V, VI, VII, VIII and XI in Research Bulletin 17. It is true that in Tables V and VI no second injection of culture was given because all rabbits died as the result of the first dose. However, provision was evidently made for the second dose of virus as shown by the space allotted to second injection of virus in Tables V and VI in case it had been necessary. In other words, the intent was evidently present, but the deed was unnecessary. In

Table VII three out of ten treated animals had succumbed, although the two control animals were alive on July 12, eleven days after inoculation. The second dose of virus on July 12 killed all animals within twenty-four hours. The results shown in this table are interesting and well illustrate the point under discusion, namely, that in conducting immunological experiments the M. L. D. is the important factor, and in many cases is most difficult to obtain. The rabbits included in Table VII had probably received almost a sufficient test dose of virus with the first injection. However, the dosage in each case perhaps differed, within certain limits at least, as the same number of virulent organisms would not be contained in successive loopfuls of blood. The data contained in Tables VIII and XI illustrate the original statements made in the critical review.

The criticism of the data involved in this work, including that contained in the recent article, depends upon the lack of methods to determine the M. L. D. of culture or virus for test purposes. The question as to the amount of virus or number of bacteria contained in one loopful is irrelevant and does not concern the point at issue. Each loopful varies within certain limits, as anyone can determine by carefully weighing successive loopfuls analytically.

Different strains vary as to virulence, as the literature shows, and the same strains in different generations and under different conditions may vary in strength. The most recent data submitted by the authors in question, which according to their line of reasoning prove for all time that hemorrhagic septicemia bacterins possess no immunizing powers, are based upon the use of 0.002 c.c. of virulent twenty-four-hour broth culture as the test dose of virus. Wesbrook, Wilson and Brimhall (11) in conducting an extensive investigation of equine anemia (swamp fever) isolated *B. equisepticus* from seventeen cases. These authors state that twelve of the seventeen strains of this representative organism of the hemorrhagic septicemia group were found to be equally virulent.

"Doses of 0.00000001 c.c. to 1.0 c.c. of a fresh broth culture killed rabbits in less than 16 hours after intravenous inoculation. A series of tests (Table IV, Experimental Investigations) showed that in most instances death took place in from two and one-half to seven hours after such inoculations. There was no evidence to show that the site selected for inoculation influenced resistance to infection, as

the results of intravenous, intraperitoneal and subcutaneous injection were almost identical."

These authors, who represent bacteriologists of note, sum up their extensive study of these members of the hemorrhagic septicemia group with the statement that "*B. equisepticus* is the most virulent microörganism for rabbits ever studied in this laboratory."

With an organism of this nature, immunological experiments in the laboratory are at present lacking in value in so far as determining the presence of immunizing power in the specific vaccine or in measuring the immunizing value of such a vaccine. Field results must be considered if fair consideration of the practical value of the products in question is desired.

It is claimed by some that no data exist in the literature which show the possible immunizing value of these vaccines in the field. Their attention is directed to the work of Wilson and Brimhall (12, pages 408 to 411 of reference). The authors conclude as follows:

"An attempt was made to immunize cattle by the injection of filtered and later of the killed cultures of the bacillus. The chief difficulties met with were in maintaining the virulence of the bacillus on artificial media and in determining the proper dosage. The experiments were too few and the results not sufficiently tested to warrant conclusive statements as to the protective value of the inoculations, but it would appear that a fairly high degree of immunity was produced."

There have been many reports from the field showing the value of hemorrhagic septicemia vaccines. Reference to various reports of State Veterinarians and State Sanitary Boards indicates that these vaccines are used to advantage.

Articles in the last issue of *The Cornell Veterinarian* illustrate the present status of this problem. In this publication Fitch (12), who appears to be one of the most vociferous exponents of the worthlessness of hemorrhagic septicemia vaccines, places himself on record as follows:

"The work of Van Es and Martin shows that the use of commercial bacterins and vaccines is worthless in the control of this disease. We believe many of the favorable reports of the use of these products is the result of incorrect diagnosis or the failure to leave uninoculated controls in the treated herd."

In the same issue Bard (14) recites his experience as a practitioner in controlling the disease in cattle by the use of vaccine. He says: "This procedure is not an 'upstart' or 'quack' idea

but a practice, the benefits of which are verified by results in thousands of cases."

In conclusion it may be stated that in so far as laboratory experimentation is concerned, no data have been advanced which conclusively prove the value or the worthlessness of hemorrhagic septicemia vaccines. The failure in the laboratory to demonstrate distinctly the presence or absence of immunizing properties in these vaccines evidently has been due to the variation, within wide limits, of the virulence of the organism and the difficulty involved in establishing the minimum fatal dose of hemorrhagic septicemia culture.

The results of extensive practice in the field, however, have demonstrated the value of hemorrhagic septicemia vaccines, and until means are developed for the accurate standardization of these products by laboratory procedures field evidence only can be considered.

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CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

TORSION OF THE UTERUS IN THE COW [1]

By C. R. Rey, *Tulare, California*

IN PREPARING this paper at the suggestion of members of the San Joaquin Valley Veterinary Medical Association for this meeting, let me say that I have no intention of appearing as an authority on the subject. I have done so purely in the attempt to bring the subject up for discussion, with the hope of possibly improving my own methods in handling this condition. I am presenting the subject solely from a practitioner's point of view, and the procedure as described will necessarily be devoid of unnecessary technicalities.

Torsion of the uterus for convenience may be described as a twist of that body to one side or the other and of varying degrees, so that the vaginal opening is so changed in relation to itself, or completely occluded, as to prevent the normal expulsion of the fetus.

This torsion, with the personal experience I have had with it, has been very slight in some cases, easily remedied, and on the other hand so severe and protracted that the organ has on autopsy been found so twisted as to resemble the twisted strands of a rope, having been twisted on itself more than once, and of so protracted a nature from the resulting inflammatory changes that the entire organ has adhered itself to the neighboring tissues, thus preventing any possible attempt at replacement of it and delivery of the fetus. In the greater average of cases that I have had, however, the organ has been twisted to the right or left (principally to the right), the twist itself constituting a half turn. In other words, the uterus may be spoken of as being upside down.

History

When the veterinarian is called the usual history is that the animal should have calved or rather was due to calve all the

[1] Presented before the California Veterinary Medical Association, Davis, California, January, 1921.

way from one day to a week. Congestion of the udder with milk. Sometimes a history of the cow straining a few times (a day or so before), and of course, if the torsion is not complete, that the animal has passed a little fluid from the vulval opening. The usual Portuguese client will inform you that the cow wants to have a calf but "she all close up behind and no can gettum in the hand—maybe got to cuttum hole—maybe better come quick—I think she gonna die."

SYMPTOMS

At the beginning of parturition straining or the expulsive efforts are more or less severe, and depending on the severity of the condition, these efforts are accompanied with a more or less slimy discharge. If the torsion is complete, however, no fluid is expelled.

Usually after a relatively short time expulsive efforts cease; the animal becomes more or less anxious, begins moving about, respiration accelerated, eyes stary, back becomes arched, and urination becomes quite frequent. After this period, which lasts for 24 to 36 hours, the animal becomes listless, lies around a great deal and eats sparingly until, if no treatment is rendered, the eyes become sunken in the orbit, she loses strength and flesh and enters into a gradual decline, which in one instance lasted as long as a month. This animal showed on autopsy extensive adhesions, a complete torsion of the uterus, false membranes and an extensive chronic peritonitis.

On exploration, after first cleansing the buttocks, tail and contiguous parts, as well as the arms of the operator, the hand on passage into the vaginal canal is arrested by the presence of a spiral fold. This turns either to the right or left, depending on the direction of the twist, and will permit of the passage of the hand if it is directed in a spiral manner, until it passes into the uterus, where the fetus may be felt. On the other hand, if the torsion is severe great difficulty is experienced in entering the uterus.

OPERATIVE PROCEDURE

In these cases the hand follows the spiral directions of the rugæ, in a careful yet persistent manner, as far as possible. The passage of the hand is a very slow and tedious process, yet if persisted in, by introducing it as far as possible, and then re-

tracting and again reintroducing repeatedly, the tissues tend to relax somewhat, until final introduction of the hand into the uterus is effected more or less easily.

The fetal membranes are now ruptured and one of the limbs of the fetus is felt for and grasped by the hand. The process from now on is confined to rotating the uterus, by torsion on the fetus, either to the right or left. If the torsion is to the right, consequently, the assistant rotates the fetus to the left, and vice versa. This rotation I have effected by means of the osteotrite.

The osteotrite is introduced alongside the operator's arm and hand slowly and carefully, until its jaws enter the uterus. (I might say that I am having made for such cases an instrument that is less bunglesome and less difficult to introduce. In one or two instances, owing to the size of the ordinary osteotrite, due to the unnecessarily large size of its jaws, I have had great difficulty and used an unnecessarily large amount of energy in introducing it into the uterus along with the hand.) The jaws of the instrument are now tightened around the limb of the fetus and the hand retracted.

Considerable care and judgment must be exercised in this procedure for various reasons: (1) The limb of the fetus may be broken and thus disrupt torsion; (2) the end of the osteotrite must be elevated or its position changed in order to permit successfully the rotation of the fetus and consequently the uterus; and, last but not least, often great pressure on the grip of the instrument is required to effect or complete the process. Usually just before the normal position of the uterus is attained, the twisting process becomes easy, and often so easy as to complete the revolution itself. As soon as this takes place a copious fluid escapes and by no means a small sigh is emitted by the operator and the patient.

The fetus is now presented and delivered. In some instances the os has not dilated enough to permit delivery. If such is the case, the limbs of the fetus are brought into the canal and reasonable traction applied to induce dilation. I have on several occasions, owing to stress of another call, left the patient, to return in 6 or 8 hours, when the fetus was delivered, and in three instances a live one.

In conclusion I might say, of course, that it is possible for a

torsion to be so extensive that introduction of the hand, far less an instrument, would be impossible. Yet in the some 20 cases that I have had in my own practice this has always been possible. One consultation case that I had was not remediable. This had been of so long standing that adhesions had taken place in the vaginal canal, and the animal was destroyed. On autopsy the abdominal cavity showed an extensive chronic peritonitis, adhesions of the organ to the viscera, and the torsion itself so extensive as to make reduction impossible.

In another case a similar condition arose in that it was impossible even to introduce a finger. In this instance a laparotomy was performed, with the faint hope of rendering the animal some assistance, by correcting the trouble in this manner, but it proved to be impossible. No adhesions or other pathological changes had taken place other than the torsion, but the constricted portion resembled a long rope. The organ had twisted on itself at least a turn and a half. The animal was destroyed.

TREATMENT FOR ATRESIA OF MILK DUCT

By JOHN K. BOSSHART, *Camden, N. Y.*

ATRESIA of the milk duct in cattle may be congenital or due to injuries to the end of the teat or to infections from within or without. Infections of the milk gland in the course of treatment for atresia of any cause most frequently occur, due to many sources, such as the ease with which the parts come in contact with infective material in the stable and by the attendant. As it is necessary to milk out the quarter with the affected teat as well as the other parts of the gland, pressure is brought upon the injured teat, which has of course the tendency to injure the swelled parts still more, and to induce pain. To obviate this the dairyman resorts to the milking tube, and then by its improper use an infection may be brought about.

In the last few years we have met with better success in treating such cases than formerly, employing a special line of treatment, and we feel, therefore, that we might describe the method in the following lines.

As soon as a teat milks with less ease than normally we advise bathing the teat before each milking in a basin of hot water and soap. We prefer to use a small cooking pan with

a long handle, about 4 inches deep and 6 to 8 inches in diameter. Holding the pan by the handle in the left hand, the teat is immersed in the bath, which should be as warm as the hand of the milker can stand, or about 110°F. The fingers of the right hand are kept in the bath and rub the end of the thus taken up, thoroughly to cleanse and soften the end of the teat. A free stream of milk can very often be obtained by this simple method, without pain to the cow, and in a few days the teat may milk normally again.

Other cases are more persistent and take a longer course of treatment. For these we wipe the end of the teat dry after milking and apply a coat of antiphlogistine that covers the end of the teat and about half an inch or more of the lateral surface. This layer should be about one-eighth of an inch thick. Some surgical cotton is then pulled so as to have a transparent layer, and this is placed over the poultice from the apex of the teat and covering all of the poultice. The clinical effects of this poultice will be apparent after the first application. By the next milking the bath is given as before and poultice applied again when milking has been accomplished and the surface has again been wiped dry. No adhesive tape or bandage are necessary, owing to the adhesive property of antiphlogistine. The outer layer covered by cotton may be dry, but the inner one remains moist.

We lay great stress upon the fact that a bath is necessary to remove the poultice, thus preventing the omission of the treatment by the attendant or milker who may be in a hurry and not willing to follow the prescribed line of treatment.

Other cases, of course, require surgical interference by the trained veterinarian.

The hot soap and water bath are in our opinion the first step always to successful instrumentation at this particular region. A warm solution of corrosive sublimate, 1 to 1,000, may be used next for the teat and for the hand of the operator. A sterilized teat dilator, bistouries or milking tubes may then be used as required.

After operation and milking the teat is rinsed in plain warm water and sponged off with a tampon with corrosive sublimate solution. It is then wiped dry and a teat plug is used as follows: A round match is lighted and permitted to burn for a

few seconds and then blown out. The charred portion is then removed from it with some sterilized cotton, in a rotary motion. A practically sterile but black surfaced teat plug is thus obtained, and will have just the right taper desired after a little practice. The posterior one-third is then broken off and the point of the plug inserted into the container of antiphlogistine to be covered with it. It is then introduced into the teat canal, projecting about one-quarter to one-half inch to the outside. The end and sides of the teat are then covered with antiphlogistine and with cotton as described before.

The teat plug thus made from a common match is inexpensive and should be renewed for each new use. Its light weight prevents it from falling out, and it does not break or bend as do metal tubes.

The following directions are given to the dairyman to carry out the routine treatment:

1. Bathe teat with hot water and soap for five minutes.
2. Disinfect end of teat with some corrosive sublimate or from stock bottle.
3. Use milking tube sterilized by boiling and brought to stable in basin just from the stove.
4. After milking wipe end of teat with antiseptic solution.
5. Wipe teat dry.
6. Make plug by charring end of a clean match as directed.
7. Cover teat plug with ointment and introduce into teat canal.
8. Use more ointment with dull table knife or putty knife for end of teat.
9. Cover with thin layer of sterilized cotton.

THE VETERINARY EXTENSION DIVISION'S TUBERCULOSIS EXHIBIT

By L. C. KIGIN

Associate Veterinarian, Purdue University, Lafayette, Indiana

AN EFFORT was made at the Indiana State Fair, by means of an exhibit, to impress upon the public the seriousness of tuberculosis in cattle. From every indication our efforts were not in vain. Many reports from over the State show con-

clusively that breeders have had their herds tested since seeing those tuberculous lesions and their relation to the animal carcass, who did not look with favor upon the test previous to that time.

The exhibit consisted of a tuberculous dressed beef carcass and the heart, lungs, liver and spleen, placed in a refrigerator. These organs were fastened as nearly as possible in their natural position. A portion of the legs was removed before the carcass could be put into the refrigerator.

This exhibit would not have been possible without the generous financial help from outside sources. A plan of the exhibit was laid before the officials of each abattoir operating under Federal supervision in Indianapolis. Each made a financial contribution and some of them gave the time of their men to help in rebuilding the large refrigerator, placing it upon the grounds, and hauling the tuberculous carcass to and from the fair grounds under the supervision and according to the rules laid down by the Bureau of Animal Industry.

The refrigerator was 8½ feet high, 6 feet wide and 4 feet from the front to back, and had a capacity of 1,200 pounds of ice. The front consisted of two panes of double strength window glass, separated by an air space, to provide insulation. Two 100-watt lights located in front of the refrigerator assisted greatly in illuminating the interior. The meat kept perfectly the entire week of the exhibit.

It is estimated that 70,000 people passed through the building and closely inspected the carcass. Some of the common expressions heard were: "I never realized the seriousness of this disease before, and I am going to have my herd tested immediately." "I never before realized the importance of Government inspection of slaughtered carcasses."

We believe that such an exhibit is the most practical and valuable method of demonstrating the seriousness of tuberculosis to a large number of people.

It was our intention to exhibit the carcass of a hog showing generalized tuberculosis, but we were unable to secure a desirable subject. This can be done at some future exhibit and the relationship of the disease in cattle and swine emphasized.

A pocket folder was distributed setting forth the general points of interest relative to the economic importance of the disease and its relation to public health.

ABSTRACTS

BIPOLAR BACILLI THE CAUSE OF INFECTIOUS CONJUNCTIVITIS IN SOLIPEDS IN EAST AFRICA. Fritz Ruppert. Deut. Tierärztl. Wchnschr., No. 7, p. 45.

THE DISEASE was observed in horses, asses and mules. In each case, the animal appeared to suffer from intense itchiness. It rubbed its head against posts, the manger, and its forelegs. The eyelids were swollen and painful. The ocular secretions were at first serous, then purulent, then mucopurulent, with consequent closure of the lachrymal duct. In many cases there was a nasal discharge. In smear preparations made from the secretions of the eye, rod shaped organisms were visible, which showed bipolar staining when chromatin was used. Subcutaneous injections of the organisms were pathogenic for rabbits. Solipeds were systemically affected when given doses of the secretions from the eye. Treatment consists in instilling into the eye a solution of nitrate of silver or a solution of 1 per cent of sulphate of zinc, twice daily. It is probable that diptera play an important part as carriers of the disease.

J. P. O'LEARY.

THE GERM-FREE RECOVERY AND PRESERVATION OF INOCULUM, PARTICULARLY BLOOD INOCULUM. B. Möllers. Centbl. Bakt., etc., 1 Abt. orig., 1918, Bd. 81, S. 347.

WHILE the causative agents of various infectious diseases have not yet been discovered, it is a well known fact that the blood at the height of the disease contains the specific germs of the malady and it is necessary at times to use such blood for inoculation purposes. Much difficulty is therefore experienced in the use of a sterilizing preservative. If the addition of 0.5 per cent phenol is used as is employed for the preservation of bacterial suspensions, the blood, when subsequently heated, coagulates, and is rendered useless. As a result of his experience, Möllers recommends the addition of 0.2 per cent formalin to blood to be used for inoculation purposes, as it is a reliable sterilizer and prolongs the keeping qualities of the material.

J. P. O'LEARY.

INFLUENZA OF THE HORSE AND INFECTIOUS ANEMIA. J. Basset. Rec. Méd. Vét., vol. 95 (1919), pp. 442-449.

IN 1911 Basset demonstrated that influenza of the horse is inoculable, caused by a filterable virus which exists in the blood; that the infectious blood retains its virulence in vitro at refrigerator temperatures for over 15 weeks, and in vivo for about 5 months; and that an immediate and complete resistance to the disease results from the first infection. In the first 2 or 3 days of the disease, fever is the only symptom to the exclusion of all others; hence the need of taking temperatures during an epizoötic.

Because of the striking similarity between the symptoms of influenza in horses and those of "typho-anemia" it was important to ascertain whether these were two distinct morbid entities.

Influenza and infectious anemia in the horse are distinct and different diseases. Several weeks after recovery from influenza, while the blood still carried the virus, horses did not react to a second injection of the same virus, but they did contract infectious anemia, like new horses.

Several workers base their diagnosis of infectious anemia on the recurrent fever and albuminuria. But there are horses, whose blood is infectious, but which for several weeks and even months, show no signs of fever. Under such circumstances the method of diagnosis fails, as it likewise does when the blood is tested for hemolysins, as nothing specific was found.

In a horse that has recovered from both influenza and infectious anemia, and whose blood carries both viruses, the resistance to the former virus is strong and it is not easy to lower the resistance of the animal so that the influenza virus makes itself clinically evident; on the other hand, the resistance to the anemia virus is not so strong and any slight lowering of the horse's resistance is sufficient to cause clinical symptoms.

In the Serbian army, Basset met an old chronic malarial patient who claimed to have cured himself as follows: When he was in good health he lowered his resistance by a prolonged bath in ice water; this brought the parasites out and they were destroyed by the patient taking a massive dose of quinine.

Based on these observations, a new method of diagnosing anemia is proposed. The resistance of the animal is altered

by injecting intravenously, 100-200 c.c. of salt solution; this provokes a febrile crisis 24 hours later, by observing which, a differential diagnosis can be made.

Influenza in the horse is an acute disease; after recovery, although the virus persists in the blood for several months, there is no relapse. Neither can a relapse be provoked by an intravenous injection of 100 c.c. horse serum.

Infectious anemia is a chronic disease. Relapses are frequent, and may be spontaneous or provoked. In cases where there are no parasites in the blood and no fever, the fever is provoked by an intravenous injection; horse serum or salt solution is suitable. It is not necessary to provoke several febrile reactions; a single temperature rise about 48 hours after injection indicates anemia. W. N. BERG.

RESULTS OF TREATMENT OF TUBERCULOUS CATTLE WITH CHAULMOOGRATE OF SODA. Rpt. Col. Agr. and Agr. Expt. Sta., Univ. of Cal., July 1, 1919, to June 30, 1920, p. 4.

Traum, in coöperation with E. L. Walker of the Hooper Foundation for Medical Research of the University of California, found no definite thereapeutic value in sodium chaulmoograte in the treatment of tuberculosis in artificially infected cattle. For many years encouraging results have been obtained in the treatment of leprosy with chaulmoogra oil. Our experiment was, however, suggested by the work of Walker and Sweeney, in which they found distinct bactericidal action of sodium chaulmoograte upon tubercle bacilli and other acid-fast bacteria.

Fifteen calves, of eight to ten months old, from a tuberculous herd but which were negative on two intradermal tests, were available for this experiment. These calves became tuberculous by drinking water containing tuberculous lung material from cattle. Fifty-five days after this exposure, all fifteen reacted strongly to the intradermal tuberculin test.

Each of five calves received intravenously 203 c.c. of 3 per cent solution sodium chaulmoograte between September 11, 1919, and January 26, 1920. In the same period, five other calves received 590 c.c. each. The five remaining cattle, used as controls, were not treated. At autopsy, March 22, 1920, no appreciable difference was found between character and extent of the lesions of the treated and untreated animals.

ASSOCIATION NEWS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the association was held in the lecture room of the Carnegie Laboratory, 338 East 26th Street, Wednesday evening, January 5, at 8:30 p. m., President MacKellar presiding.

The minutes of the December meeting were read and approved.

The President presented a timely and well-chosen address and also expressed his appreciation and thanks for the honor of being re-elected president.

He laid much stress on the value of association work as measured by the individual interest of its members in reporting their cases and interesting experiences. Another suggestion urged by the president was that of increasing the membership of the association. He asked each individual member to try and bring in at least one new member during the year as his quota. He also urged the coöperation of the members with the Program Committee by the presentation of papers and case reports and discussions of subjects presented.

The President approved the following committees:

Program—Dr. Geo. H. Berns, Chairman; Dr. W. Reid Blair, and Dr. Cassius Way.

Prosecuting—Dr. W. J. McKinney, Chairman; Dr. G. C. Rohrer, Dr. E. A. Durner, Dr. R. W. Gannett, and Dr. Thos. E. Corwin.

Legislative—Dean W. H. Hoskins, Chairman; Dr. W. Reid Blair, and Dr. R. W. McCully.

Professor John F. De Vine gave an excellent report of the 24th annual meeting of the United States Livestock Sanitary Association, held in Chicago on November 29 and 30 last. He said that the excellent program presented attracted a large attendance at every session and that he regarded the meeting as one of the largest and most interesting in the history of the organization. The Professor supplemented his report with a talk on contagious abortion and anthrax, which brought out

a good discussion joined in by Drs. McKinney, Eichhorn, Gannett, Berns, Ticehurst and Dean Hoskins.

In presenting case reports, Dr. Gannett gave a report of a case of a bitch which he operated on for pyometra. He removed the uterus close to the os and the animal made a good recovery. Dean Hoskins, reporting for Dr. Henning, described a case of prolapsed rectum in a pig which he operated on successfully, and a pig infested with bronchial filaria which he treated with injections of turpentine, carbolic acid and olive oil in the trachea with good success. Dr. Ackerman, reporting a case of distemper in an English bulldog with lung complications, said he had given serum and bacterin simultaneously and that the dog made a remarkable recovery. Dr. Gannett asked Dr. Blair if he had used normal horse serum in canine distemper to which Dr. Blair replied that he had used it but with indifferent results.

Dr. Shaw reported Dr. Patrick Burns seriously ill in the hospital. President MacKellar said he would investigate and visit him. Dr. Gannett asked about Dr. David Cochran's condition and Dean Hoskins reported that he had improved and that the doctors had failed to find any organic trouble. He said that he had found him mentally depressed and asked that as many of the members as could conveniently do so call on him and cheer him along.

New business brought up included the reading of a letter from the Horse Association of America by its secretary. Dr. Ackerman brought up the subject of having the association meet every three months instead of every month as at present, but the consensus of opinion was against this proposition.

Dr. J. Payne Lowe extended an invitation to the members to attend the New Jersey Veterinary Medical Association meeting at the Trenton House on January 18. Dr. Gannett asked the members not to forget the 13th annual conference at Ithaca on January 20 and 21.

As no further business appeared the meeting adjourned.

J. ELLIOTT CRAWFORD, *Secretary.*

MASSACHUSETTS VETERINARY ASSOCIATION

The regular January meeting of the Massachusetts Veterinary Association was held at the New American House, Boston,

Wednesday evening, January 26; 35 members and 4 guests being present.

A very interesting talk illustrated by blackboard drawings was presented by Dr. Ralph W. Balkam of Springfield, Massachusetts, on "Infectious Abortion," after which a lunch was served. A general discussion of Dr. Balkam's paper followed, and also reports by Dr. Mason and Dr. Peirce on recent outbreaks of hemorrhagic septicemia in cattle, and reports by Drs. Playdon and Gilbert on a form of contagious pneumonia which had occurred in their practice. Interesting cases were reported by Drs. Ryan, Maloney and Babbitt.

HARRIE W. PEIRCE, *Secretary.*

MISSOURI VALLEY VETERINARY ASSOCIATION

The winter meeting of the Missouri Valley Veterinary Association held at Kansas City, Mo., February 8, 9 and 10, must be rated as one of the most satisfactory in its history. While the attendance was somewhat less than one year ago, over 200 members and over 50 ladies were present. The first two days of the meeting were devoted to papers and discussions, the entire third day being devoted to clinical work.

The first paper on the program was a series of case reports by Dr. R. L. Allen of Windsor, Missouri. The cases were those of an obscure type of forage poisoning. This was followed by a well written paper on "Cornstalk Disease Among Cattle," by H. F. Lienhardt, Manhattan, Kansas. Dr. Lienhardt reported on three recent outbreaks of cornstalk disease in cattle, in addition to three previously reported during January. The animals affected showed weakness, wabbling gait, temperatures normal or subnormal and death within a few hours to 48 hours. Autopsies revealed numerous hemorrhagic lesions involving the serous membranes, liver, spleen, pancreas, and cardiac envelopes. There were also considerable edema, some pneumonia and enteritis. No impaction was found in any case examined. Bacteriological studies gave negative results, both in culture media and in animal inoculation, material having been taken from various organs and blood. Examinations of the feed and feces revealed no *Bacillus botulinus,* and filtered extracts of the feed produced no toxemia in guinea pigs. Analyses for prussic acid and nitrates revealed no sufficient cause of toxic

action from these sources. In some cases the animals were left in the stalk fields or were replaced by other cattle without further loss. The cause of death in these herds therefore remains unexplained.

Dr. Robert Graham of Urbana, Illinois, followed with a most interesting dissertation on botulism, using lantern slides to show the nature of several experiments carried on. Dr. Graham has discovered *Bacillus botulinus* in numerous feedstuffs and has dealt with a number of outbreaks of this trouble in animals. The laboratory of the University, at Urbana, Illinois, is producing a limited quantity of botulinus antitoxin of the polyvalent type, which may be secured for the treatment of animals suffering from botulism. He states that no symptomatic differentiation between type A and type B is attempted, but that the antitoxin now used combines both types and is therefore curative in action in any case of true botulism.

Dr. J. C. Flynn of Kansas City, Missouri, read an interesting paper entitled "Sarcoptic and Follicular Mange." Sarcoptic mange is characterized in dogs by its ease of transmission, marked irritation of the skin, particularly in such regions as the base of the skull, the back, neck and inner surface of the legs and on the feet. Small nodules are produced by the burrowing habit of the parasite, which later fill with fluid that may become infected with pus-producing bacteria. He regards the odor given off from the lesions as being quite diagnostic. Specimens may be obtained for microscopic examination only by scraping deep enough to open up the burrows of the parasite. This type of mange is treated satisfactorily with lime and sulphur dips and a satisfactory method of applying this treatment is to have certain days set aside for dipping all of the animals under treatment. The dip is placed in a barrel at the proper temperature, each dog being completely submerged, the eyes and mouth being held shut by the operator in order to prevent unnecessary irritation from the dip. The animals are permitted to dry with the dip on their bodies. The operator protects his person with rubber garments and boots. The average case responds to four dippings, while some require eight or ten treatments. Clipping, bathing and brushing the body aids the treatment considerably; the yards and premises

in general must be also disinfected in order to prevent reinfestation.

Follicular mange in the doctor's experience is less easily transmitted; develops more slowly and produces less irritation. The treatment recommended is sponging the skin freely with a 5 per cent solution of formalin, followed in a few minutes with an application of sulphur ointment or vaseline. Two applications each for two weeks will as a rule result in a cure, although some cases are more persistent and require several treatments. Contrary to the usual belief, Doctor Flynn regards follicular mange as more easily cured than the sarcoptic form.

Dr. W. H. Bailey presented an interesting discussion of "Thyroidectomy in Puppies." This operation is undertaken as an emergency measure to relieve the pressure upon the trachea in very young puppies, which otherwise die from suffocation. Surgical treatment in his hands has been quite satisfactory.

"Modern Biologics" was the title of an ably prepared paper by Dr. E. A. Cahill of Zionsville, Indiana. Dr. Cahill set forth in a very able manner the principles underlying immunity as affected by various biologic agents. He made a plea for a more thorough understanding on the part of practitioners, of the manner in which various immunizing substances operate, in order that these classes of agents may be used with a greater degree of specificity. His paper was one of the best treatises on this subject that has been contributed to veterinary literature.

Dr. S. L. Stewart of Olathe, Kansas, read an excellent paper on mammitis in cows. He called attention to the distinctions to be made between different classes of inflammations involving the udder and related structures. His methods of treatment met with general aproval and it is hoped that the full text of his paper will be read by the veterinarians upon its appearance in the veterinary press.

Dr. W. T. Spencer of Lincoln, Nebraska, sent his paper on "Progress in Tuberculosis Eradication in Nebraska" by his assistant, Dr. F. R. Woodring. The paper was well read and is a tribute to the aggressive work of Dr. Spencer, his helpers and the practitioners of Nebraska. The work in tuberculosis eradication in Nebraska began in August, 1918, with two state

and two federal veterinarians employed. At the present time 497 herds are under supervision, with one hundred signed applications on file awaiting their turn. Twelve veterinarians are giving full time to the work and the State Legislature is being asked for $300,000 to continue the work of cleaning up the herds of the state. A state law requires the annual testing of all cows from which milk and cream are to be sold to be consumed in the raw state. Public sentiment has been changed so that it now strongly favors tuberculosis eradication and the veterinary practitioners are giving hearty coöperation in the work, private testing being carried on to a much greater degree than ever before.

Mr. Wayne Dinsmore, Secretary of the Horse Association of America, gave a very able address under the title of "Economic Factors Favoring Horse and Mule Production and Use." Mr. Dinsmore's forceful style, faultless diction and sound logic made a very strong impression upon his auditors. He maintains that the horse has been largely supplanted in industries because of the faulty knowledge regarding operation costs, and that where comparative costs have been made, horses are still in use, or motors are being sold with the intention of restoring the horse to his rightful place. The farm tractor, according to his investigations, is rarely a satisfactory substitute for the horse and the man who has used a tractor for a few years is one of the horses' best friends. The organization which Mr. Dinsmore represents is enrolling many veterinarians and veterinary societies, and by contributing to its support and its work in disseminating facts regarding the horse, veterinarians are not only benefiting themselves but are saving farmers, merchants and others from adopting costly motor machinery in place of retaining their trustworthy horses and mules. Members of this organization receive voluminous literature containing the results of extensive statistical studies.

Mr. P. H. Ross, Acting Director of Extension Service, University of Missouri, discussed in an able manner the relation existing between extension workers and practicing veterinarians. Mr. Ross is fully conversant with the friction which has existed in some sections between county agents and veterinarians, which he attributes largely to a failure of many county agents to understand their proper duties and a lack of get-together spirit on the part of both parties. These con-

ditions he finds have largely disappeared and in many sections the county agents and veterinarians are working hand in hand to their mutual advantage. Speaking of his own state, he desires the coöperation of veterinarians in learning of unwarranted acts on the part of extension workers, particularly if they seem to be encroaching upon the duties properly belonging to the veterinarian. His address was heartily applauded and we believe greatly appreciated.

Dr. John R. Mohler, Washington, D. C., who was listed on the program for a paper entitled "The Veterinary Practitioner in Animal Disease Control," found it impossible to leave Washington because of duties in connection with agricultural legislative work.

Dr. U. G. Houck ably represented his chief, reading the former's paper and participating in a number of the discussions. Dr. Mohler's paper drew attention to the necessity for central direction in matters of disease control, particularly when dealing with the great animal scourges. Federal authorities have, however, too small a force to undertake such work single handed and have limited authority when dealing with intrastate problems. It becomes, therefore, necessary that they should coöperate with state forces and in so far as possible with private practitioners. In all great undertakings the federal government has met with considerable opposition, not only from the public but oftentimes from veterinary practitioners who thought that their own interests were being jeopardized. Experience has shown, however, that in all such undertakings the practitioner has been benefited rather than harmed by federal action.

Speaking more specifically of the accredited herd plan for tuberculosis eradication, he drew attention to the criticism from some quarters because of the exclusion of practitioners from participation in this kind of work. The plan was advocated by the U. S. Livestock Sanitary Association and representatives of purebred cattle breeders' associations and was submitted to the Bureau for its consideration. One of the provisions of the plan was that "Tests shall be made under the supervision of the Bureau of Animal Industry or a regularly employed veterinary inspector of the state in which cooperative eradication work is being conducted." Thus under this rule only certain agents were recognized as legally

qualified for the work. Instead of proving a detriment, however, private practitioners have found that their private testing has been greatly increased, also that more of the interstate testing has been allotted to them in order that federal agents might devote more time to the accredited herd work. Reports from various state associations indicate that private testing has increased 50 per cent in Michigan, 55 per cent in Minnesota and nearly 100 per cent in Iowa. That there has been an increase in private testing since the accredited herd plan has been in operation is also indicated by an increase of over 300 per cent in the production of tuberculin by private concerns. This, too, in spite of the fact that a much larger number of animals than formerly are now tested by the intradermal method, with a much smaller dose than is used by the subcutaneous method. In other words, the accredited herd plan has stimulated such an active response on the part of the owners of good stock that more attention is being paid to their health and care. All such measures are sure to redound to the benefit of the veterinary practitioners in communities affected.

Dr. H. M. Graefe of Topeka, Kansas, read a comprehensive paper dealing with suggestions for the handling of recently vaccinated swine to eliminate bad results. The doctor emphasized as essentials, potent serum and virulent virus, properly administered in proper dosage, following which there must be exercised the best of care in order that the immunity produced will be of sufficient intensity to overcome the virus introduced and provide later immunity as well. Conditions of housing, feeding and exposure which deplete and lower general resistance render it impossible for the animal to counteract the effects of virus and build up antibodies for later protection. He regards much of the trouble which has been variously summed up under mixed infection, swine plague, etc., as intimately connected with low grade cholera infection. He considers that the value of bacterins in offsetting such mixed infections has been overestimated. In so-called hog-cholera breaks he advises revaccination with serum alone with good sanitation and after care.

The work of the clinic was in charge of Dr. H. M. McConnell and his assistants. The first series of cases were those of diseases in chickens. Dr. R. C. Moore performed an interesting

test operation in a cow. Dr. W. L. Boyd of St. Paul, Minnesota, demonstrated his treatment for sterility in cows. His work is of a very high order and his advice was eagerly sought. Sterility in sows was discussed by Dr. J. L. Hearn of Texarkana, Arkansas, from the standpoint of the breeder of swine. Dr. J. W. Connaway of Columbia, Missouri, is especially asking that information which might be of value in connection with the possible co-relationship of abortion disease in swine and cattle be reported to him for use in connection with work which he is undertaking.

Dr. S. W. Alford demonstrated the cutting of ties in the back of a Hereford heifer as a means of preparing the animal for exhibition. Following the clinic, the Kansas City Stockyards Company entertained the entire body, including the visiting ladies, at a substantial dinner on the ninth floor of the Livestock Exchange Building. A vote of thanks was tendered the Stockyards Company for its courtesy in connection with the dinner and the facilities provided at the sales barns for conducting the clinical program.

The next meeting of the association will be held in Omaha, probably during the second week in July.

R. F. BOURNE, *Secretary.*

VETERINARY ASSOCIATION OF MANITOBA

The annual meeting of the Veterinary Association of Manitoba was held in Winnipeg on February 15, 1921.

Dr. F. Torrance, the Veterinary Director-General of Canada, was the principal speaker. He stated that the people of Canada must realize that the fight against bovine tuberculosis is not merely an economic one for the livestock breeder and the livestock owner, but a question that involved the whole of the community.

Incidentally Dr. Torrance mentioned, commenting upon some observations regarding the establishment of a laboratory in Manitoba, that it might be possible to utilize the equpiment of the Manitoba Agricultural College for such a purpose until the federal authorities considered they were in a position to provide the funds for the institution.

"When twenty-five per cent of the young children who die from tuberculosis received the infection from drinking the

milk of cows affected with the disease, it is time," said he, "for us to awake to the necessity of doing something to protect them." Calling attention to the regulations which municipalities could now enforce with respect to dairies, he stated that the cost to the municipalities was practically nothing and low for the dairyman whose dairy was inspected and cows tested. The regulations had been in effect in Saskatoon for years and that trial had demonstrated their effectiveness. "The system is working very satisfactory," he said, and added that no one could tell the number of lives that had been saved through the supply of pure milk. "At any rate," he commented, "the community knows its children are not drinking tuberculous milk."

Speaking generally of the enforcement of regulations for the testing of cows Dr. Torrance pointed out that they had to secure the coöperation of the owners, and outlining the work of the department in the direction of securing accredited herds, herds free from the disease, he said it had been discovered that the ravages of tuberculosis were such that it must have a serious influence on the livestock supply of the nation.

The growth of accredited herds, he pointed out, was increasing in the United States and he declared that it was realized that unless Canada took similar steps, the time was coming when that market would be closed to Canadian breeders. Steps in this direction were taken last fall and the scheme had been in effect in the Dominion a little over a year. The department, he stated, was receiving the heartiest coöperation from the owners of livestock and up to last week 379 herds had been tested.

The department, said Dr. Torrance, hoped to be able to get the assistance of the general practitioner in this work of testing and it was proposed to have a list of veterinarians throughout the country qualified for the service. With this object in view an examination would be held in Winnipeg on March 15. By these practitioners, tests would be conducted for livestock owners at the owner's expense.

President John Bracken of the Manitoba Agricultural College spoke on the relation of veterinary science to agriculture. Short addresses were also delivered by Dr. A. G. Husband, of Belmont; Major S. Robinson, Bradon; Dr. J. A. McLeish,

district supervisor federal meat division; Dr. W. A. Shoults, Winnipeg, and Dr. J. A. Stevenson, Winnipeg.

The proceedings during the evening session were varied with a musical program excellently supplied by A. Gaunt, S. Banks, and R. A. Richardson, piano.

The officers elected were: F. W. Bryant, Dauphin, president; Dr. J. S. Mack, Neepawa, vice president, and Dr. J. B. Still, Winnipeg, secretary-treasurer. The council for the coming year is Dr. Still, Winnipeg; Dr. J. A. Munn, Carman; Dr. W. Hilton, Winnipeg; Dr. Bryant, Dauphin; Dr. Mack, Neepawa; Dr. H. R. McEwen, Stonewall; and Dr. W. H. Lee, Minto. The examining board is Drs. Munn, Hilton and McEwen.

By resolution the association approved of the action of its council in recommending to the liquor license department that the amount of liquor to an individual veterinarian be reduced to three gallons per week, this being considered sufficient for the requirements of the average practice. Dr. Munn, the retiring president, referred in his address to the improvement in the course of instruction at the Ontario Veterinary College under the principalship of Dr. C. D. McGilvray.

J. B. STILL, *Secretary.*

MICHIGAN VETERINARY MEDICAL ASSOCIATION

The 39th annual meeting of the Michigan State Veterinary Medical Association, which was held in the Surgery and Clinic Building at the Michigan Agricultural College on February 8, 9 and 10, was one of the most successful meetings ever held by this association. The attendance was about 150. In addition to this about 30 ladies attended the program planned for them.

Dr. R. H. Wilson of Rochester, Michigan, presided, and most of the first day's session was given over for the transaction of business. Toward the close of the session, however, a question box was opened and conducted by Dr. H. Preston Hoskins of Detroit.

On the evening of the 8th a dinner-dance at the East Lansing Masonic Temple provided the social event of the meeting. Entertainment was furnished by college talent and was greatly enjoyed. The presence of the wives, daughters and sweethearts added spice to the occasion and made possible the danc-

ing party. Those who neglected to bring their wives spent the evening at cards or visiting.

The forenoon of the second day was given over to Dr. David S. White of Ohio State University and Dr. T. H. Ferguson of Geneva, Wisconsin. The former read a very forceful paper which dealt with the history, duties and outlook of the veterinary profession. The latter talked on "Abortion and Sterility from the Practitioner's Standpoint," and later in the day, along with Dr. C. B. Conyer of Richland, discussed teat surgery.

The annual election took place on the afternoon of the 9th with the following officers elected: President, B. A. Perry, Hastings; First Vice President, A. Z. Nichols, Pittsford; Second Vice President, B. J. Killham, Adrian; Third Vice President, H. Preston Hoskins, Detroit; Secretary and Treasurer, R. A. Runnells, East Lansing. The board of directors remains the same as last year except that Dr. F. M. Blatchford of Brighton was elected to fill the vacancy caused by Dr. H. M. Armour moving out of the state.

Clinic was held on the forenoon of the 10th, Drs. C. A. McKillop, J. P. Hutton and E. K. Sales performing two radical operations for fistulous withers and amputating the tail of a horse affected with sarcoma.

A tuberculosis conference was held in conjunction with the meeting. The State and Federal authorities and the College staff coöperated in making the conference a success. A herd of 15 head was tested by the subcutaneous and ophthalmic methods and the intradermic and opthalmic tests were demonstrated on six reactors from another herd. At the conclusion of the tests these animals were killed and the lesions demonstrated. The object of the conference was to help prepare veterinarians for the examination to be given by the Bureau of Animal Industry when it selects practitioners to take over the accredited herds.

The ladies report having had a very pleasant time during the sessions. A theater party, the dinner-dance, a tour of the College campus and a farewell get-to-gether completely occupied their time. RUSSELL A. RUNNELLS, *Secretary.*

ILLMO VETERINARY MEDICAL ASSOCIATION

The Illmo Veterinary Medical Association held its 16th semi-annual meeting March 17 and 18, 1921, at the Exchange Build-

ing, National Stock Yards, Illinois.

This was the first two-day meeting this thriving association ever held, and an interesting program kept the audience keyed up from the beginning to the end.

J. E. JENNINGS, *Secretary.*

SOUTHERN CALIFORNIA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the California State Veterinary Medical Association will be held June 6-8 at Fresno, California, at which time we hope to have a more complete and exhaustive program than this association has ever attempted.

At the regular monthly meeting of the Southern California Veterinary Medical Association held at Room 112, Normal Hill Center, Los Angeles, California, on Wednesday, February 16, former Secretary Dr. J. A. Dell tendered his resignation effective at once. It was accepted and a vote of thanks was tendered Dr. Dell for his long and faithful service, he having been secretary of the association for the past ten years. Dr. J. P. Bushong was appointed by the association to fill the unexpired term of Dr. Dell.

There were papers read by Drs. T. H. Agnew and M. Rosenberger. We further considered, in general discussion, the Bureau of Animal Industry's interpretation of the intradermal test reaction. There were in attendance 22 members and 2 visitors.

J. P. BUSHONG, *Secretary.*

President White has appointed Dr. H. Preston Hoskins of Detroit, Michigan, as Secretary of the Section of Sanitary Science and Police of the A. V. M. A., in place of Dr. B. T. Simms of Oregon, who asked to be relieved. Dr. Hoskins has been active in obtaining excellent papers for the program in the past and it is certain that he will have a fine program for the Denver meeting.

President White has appointed Dr. H. J. Frederick of Logan, Utah, as Resident Secretary for that State, to succeed Dr. Ernst of Salt Lake City, who has resigned.

Dr. Ernst plans to go into other lines of business.

NECROLOGY

Dr. L. A. Wheeler of East St. Louis, Ill., died February 4, 1921, leaving a wife and five small children.

Dr. Wheeler was a member of the B. A. I. force at National Stock Yards, Illinois, and was a graduate of the New York State Veterinary College at Cornell, 1908.

He was an active member of the Mississippi Valley Division of the National Association of Bureau of Animal Industry Veterinarians and became affiliated with the American Veterinary Medical Association in 1918.

Dr. Wheeler's boyhood home was at Cuba, New York, where he spent several years of his professional career in the employ of the Borden Condensed Milk Company. He was a comparatively young man, being thirty-eight years of age. For several years he had been suffering from gall stones. The immediate cause of his death was an attack of pleurisy which resulted fatally on the fifth day.

Mrs. N. M. Repp, wife of a member of the A. V. M. A., passed away at the family home, Perry, Iowa.

Few of Mrs. Repp's friends knew that she was seriously ill, although they knew she had been suffering for several days from an ulcerated tooth. A short time after the tooth was taken out infection set in, the left side of her face being badly affected. The infection spread through her neck and chest and for several days she suffered severely. Consultations of physicians were held and everything possible was done to relieve her but the septicema went through her system so rapidly that all efforts were in vain.

Mrs Repp was well known in the city and in the community south of Perry. Her entire life has been spent in the county and her death will be mourned by many. She is survived by her husband and one son, Junius Repp.

The friends of the late Dr. S. F. Musselman have published in brochure form the various eulogies which were delivered in memory of the deceased during the meeting of the U. S. Livestock Sanitary Association in Chicago, November 29, 1920.

MISCELLANEOUS

INTRADERMAL TUBERCULIN TEST

At the last annual meeting of the American Veterinary Medical Association, August 23 to 27, 1920, the International Committee on Bovine Tuberculosis recommended that a questionnaire on the intradermal tuberculin test be sent to the entire membership of the association.

This recommendation was accepted (see the JOURNAL of the A. V. M. A., November, 1920, pp. 227 to 229), but no provisions were made for the work and expense incident to carrying it into effect; hence, it is necessary to adopt some expedient for this purpose. How great the work and expense would be to place a copy of a questionnaire in the hands of each member of the association in the customary way may be judged from the fact that it would require addressing about 5,000 envelopes, and that the bill for postage alone would be approximately $100.

After thorough consideration it was concluded that the best available expedient would be the publication of the questionnaire in the JOURNAL, with the request that those who can answer any one or more of the questions it contains will take the necessary time and paper and write their answers concisely and mail them to the Chairman of the Committee on Bovine Tuberculosis, Dr. E. C. Schroeder, Bethesda, Md.

All the members of the American Veterinary Medical Association are therefore urgently requested to give the following questionnaire careful attention and to contribute what they can to make the adopted expedient successful.

Questionnaire on the Intradermal Tuberculin Test.

The Committee of the American Veterinary Medical Association on Bovine Tuberculosis, recognizing that the intradermal tuberculin test for tuberculosis among cattle, used alone or in conjunction with other tests, has increased greatly and continues to grow in popularity, and that no satisfactory uniformity exists in the interpretation of its various phenomena, believes that a tabulation of the answers that may be made to the following questions by those who have more or less ex-

perience in the use of the test, may prove very valuable to the entire veterinary profession.

Questions

1. Describe the phenomena you interpret as an intradermal tuberculin reaction.
2. Describe the phenomena which may be mistaken as an intradermal tuberculin reaction.
3. What is the average number of hours after injection in which an intradermal reaction begins?
4. What is the average number of hours after injection in which the reaction reaches its maximum?
5. What is the average number of hours during which the reaction persists?
6. Kindly indicate on how much experience your answers are based.

If you have other information on the intradermal tuberculin test that may be valuable, please give it briefly. In the way of suggestion your attention is called to questions like the following, which have not been finally answered.

a. Is a toleration for tuberculin caused by repeated intradermal injections?
b. Is the conjunctiva sensitized for tuberculin through an intradermal injection?
c. How is the intradermal test affected by previous subcutaneous or ophthalmic tests?
d. How does the intradermal test affect subsequently made subcutaneous tests?
e. What is the relative reliability of the intradermal test?

NOTES FROM COLOMBIA

The following letter was received by Secretary Mayo from Dr. Chas. V. Noback, who recently arrived at Bogota:

Colombia is a very interesting country of marked contrasts. It has climates of different kinds from the hot humid tropics of the coast where you almost envy the native with no clothes and where a cold shower is always welcome, to the temperate climate on the plateau or sabanas, 8,600 feet above the sea level or to the paraños, where it is always very cold, with the snow-capped mountains.

You leave the tropical city of Barranquilla and go up the Magdalena River, the principal route for the interior, under the hot sun during the day on the river boat and bitten by the ferocious tropical mosquito at night, until you reach Girardot about a week later.

Girardot is a coffee market and the beginning of the Girardot Railway, which takes you to one of the most interesting inland and high cities in the world, 8,600 feet above sea level, the city of Bogota, older than any city in the United States, discovered in 1527 and ever since the capital of Colombia, or as it used to be called, Nueva Granada.

You leave Girardot at about seven-thirty in the morning. It is hot and sultry; you are in your tropical clothes. People advise you to have your overcoat ready when you get to Esperanza, about half way up. It almost makes you laugh. The train pulls out and soon begins the climb, and sure enough about two o'clock in the afternoon you begin to feel a little refreshed and cool, later in the afternoon you feel chilly and the overcoat is welcome. There is a corresponding change in the vegetation in the higher altitudes, where you see wheat and rye. Towards evening it gets cold. You change cars at Facatativa on the Sabana Railway for Bogota. Bogota is reached about 8 P. M., and you are mighty glad to have your overcoat, for it is always cold, 8,000 feet above sea level at night, even in the tropics.

At this altitude (in the Eastern Cordillera) is the plateau of Bogota. Some parts are semi-arid and the cactus is at home. Other parts, better watered, are very fertile, the soil is of a loamy character, said to have been the bottom of an ancient lake like Titicaca many years ago. On the savanna are found many fine cattle, principally beef and dual purpose animals. There is a marked contrast between the savanna cattle and those from the hot country. Those from the latter section are called calestanos and are tick infested. Those calestanos are thin and rangy, while the sabaneros or savanna cattle are sleek and fat. The former bring in the tick and tick fever to the latter. If the savanna cattle are not vaccinated they come down with tick fever. An examination of blood in acuate febrile cases reveals the *Piroplasma bigeminum* in the red corpuscles.

HOLLOW HORN

Saturday at the Star Hill Vat
  Zeke Moody came with cattle that
He'd brought to dip; but one cow shy
  And when I asked the reason why,

He sagely stroked his chin unshorn,
  And said: "She's got the Hollow Horn,
The worst case that I ever saw
  Her horn is hollow to the core.

I sure did work on that old cow
  But I have got her doctored now.
There was no fun in it at all
  I had to use a harness awl,

In both her horns a hole I bored
  In which the medicine I poured;
The best remedy that's been found
  For Hollow Horn is a compound,

To make the same is rather hard,
  Take quart pine tar and cup of lard,
Cook on slow fire 'till near a boil
  Then add a cup of linseed oil;

Keep stirring well until it's cool
  (I never overlook this rule)
And one thing more I most forgot,
  Add a crushed garlic while its hot.

I filled her horns plumb to the top
  And plugged them with a wooden stop,
Then swabbed them well with turpentine
  And wrapped them up with cloth and twine,

Hollow Horn can't be cured folks say,
  But then you's got to know the way,
And I have doctored quite a few,
  I reckon I'll cure this one too."

L'envoi

Wednesday passing Zeke's plantation
  I noticed something of a row,
And saw upon investigation,
  Buzzards feasting on Zeke's cow.

—HAROLD N. GUILFOYLE.

VETERINARY ASSOCIATIONS

Secretaries of Veterinary Associations are requested to cooperate with us in keeping this directory up to date.

Name of Organization	Date of Next Meeting	Place of Meeting	Name and Address of Sec'y.
Alabama Vet. Med. Ass'n	.....	Auburn	C. A. Cary, Auburn
Alumni Ass'n College of Vet. Med. O. S. U.	.....	Columbus	W. R. Hobbs, care O. S. U. Columbus, Ohio
Alumni Ass'n N. Y.-A. V. C.	Sept.,Dec.,March	338 E. 26th St..	Adolph Eichhorn, Pearl River, N. Y.
Alumni Ass'n U. S. C. V. S.	June.....	Wash., D. C...	
American Vet. Med. Ass'n..	Sept. 5-9, 1921..	Denver, Colo...	N. S. Mayo, 4753 Ravenswood Ave., Chicago
Arkansas Veterinary Ass'n..	.....	.....	R. M. Gow, Little Rock
B. A. I. Vet. Ass'n of Iowa..	.....	Ames, Ia.....	F. Jelen, Cedar Rapids, Ia.
B. A. I. Vet. In. A., S. Omaha	3d Mon. each mo	S. Omaha, Neb.	J. V. Giffee, So. Side, Omaha
B. A. I. Vet. Ass'n, Metro Div.	.....	338 E. 26th St..	
British Columbia Vet. Ass'n.	.....	.....	K. Chester, New Westminister, B. C.
California State V. M. Ass'n	June.....	Fresno.....	J. P. Bushong, Los Angeles
Central Canada V. Ass'n...	.....	.....	A. B. Wickware, Ottawa
Central N. Y. Vet. Med. Ass'n	June and Nov..	Syracuse.....	W. B. Switzer, Oswego
Chicago Vet. Society.....	2d Tu. each mo.	Chicago.....	A. A. Leibold, Chicago
Colorado State V. M. Ass'n.	.....	.....	I. E. Newsom, Ft. Collins
Conestoga Veterinary Club..	2d Thur.each mo	Lancaster, Pa..	H. B. Brady
Connecticut V. M. Ass'n....	.....	.....	G. E. Corwin, Hartford
Dominion Vet. Meat Inspectors' Ass'n of Canada....	3d Sat. each mo.	Toronto.....	Wm. Tennant, Toronto
Eastern Iowa Vet. Ass'n...	.....	Muscatine.....	S. E. Houk, Muscatine
Genesee Valley V. M. Ass'n.	.....	Rochester	J. H. Taylor, Henrietta, N. Y.
Georgia State V. M. A.....	.....	Athens.....	W. M. Howell, Valdosta
Hudson Valley V. M. A....	.....	.....	W. H. Kelly, Albany
Idaho Ass'n Vet. Graduates	.....	.....	C. V. Williams, Blackfoot
Illmo Vet. Med. Ass'n.....	.....	Collinsville, Ill..	L. B. Michael, Collinsville, Ill.
Illinois State V. M. Ass'n..	.....	.....	L. A. Merillat, Chicago
Indiana Veterinary Ass'n..	.....	.....	G. H. Roberts, Indianapolis
Iowa Veterinary Ass'n.....	.....	Ames	H. D. Bergman, Ames
Kansas State V. M. Ass'n..	.....	.....	W. J. Guilfoyle, Kansas City
Kentucky V. M. Ass'n.....	.....	Louisville	H.Gieskemeyer, Fort Thomas
Louisiana V. M. Ass'n.....	.....	.....	E. I. Smith, Baton Rouge
Maine Vet. Med. Ass'n.....	.....	.....	
Massachusetts Vet. Ass'n..	Monthly.....	American House Boston.....	Harrie W. Peirce, W. Medf'd
Michigan-Ohio V. M. A.....	March, 1921....	Adrian.....	W. E. Watson, Metamora, O.
Michigan State V. M. Ass'n.	.....	.....	Herbert F. Palmer, Brooklyn
Minnesota State V. M. Ass'n	July 14-15.....	Hutchinson.....	C. P. Fitch, St. Paul
Mississippi State V. M. Ass'n	.....	.....	J. A. Barger, Jackson
Missouri Valley V. Ass'n...	.....	Omaha, Neb....	R. F. Bourne, Ft. Collins, Col.
Missouri Vet. Med. Ass'n..	.....	.....	Chas. D. Folse, Kansas City
Montana State V. M. A.....	.....	Butte	A. D. Knowles, Missoula
Nat'l Ass'n B. A. I. Veterinarians.....	Meet with A. V. M. A.....	.....	S. J. Walkley, 945 39th St. Milwaukee, Wis.
Neb. Vet. Med. Ass'n.....	.....	Grand Island...	C. J. Norden, Lincoln
Nevada State Vet. Ass'n..	.....	Reno.....	Lewis H. Wright, Reno, Nev.
New York S. V. M. Society	.....	Ithaca	C. E. Hayden, Ithaca
North Carolina V. M. Ass'n	.....	.....	J. P. Spoon, Burlington
North Dakota V. M. Ass'n.	July 13-14.....	.....	R. S. Amadon, Fargo
North-Western Ohio V. M. A.	.....	.....	C. E. Hershey, Tiffin, O.
Ohio State V. M. Ass'n.....	.....	.....	R. I. Bernath, Wauseon
Ohio Tri-County Vet. Ass'n.	.....	.....	W. R. Lukens, Hillsboro
Ohio Valley Vet. Med. Ass'n	.....	.....	C. S. Henry, Terre Haute
Oklahoma State V. M. Ass'n	.....	.....	H. Wood Ayers, Okla. City
Ontario Vet. Ass'n.....	.....	Toronto.....	J. S. Glover, Toronto
Oregon Vet. Med. Ass'n..	Aug. 10-11.....	.....	B. T. Simms, Corvallis, Ore.
Pennsylvania State V. M. A.	.....	.....	R. M. Staley, Oak Lane
Philadelphia Veterinary Club	4th Tu. each mo.	Philadelphia ...	C. S. Rockwell, 5128 Chestnut St., Phila.
Philippine Vet. Med. Ass'n.	.....	.....	A. K. Gomez, Manila
Portland Vet. Med. Ass'n..	4th Tu. each mo.	Portland, Ore...	Sam. B. Foster, Portland, Ore
S. Carolina Ass'n of Veter'ns	.....	Union.....	B. K. McInnes, Charleston
Schuylkill Valley V. M. A...	.....	Reading.....	C. R. Potteiger, Reading
South Dakota V. M. A.....	.....	.....	S. W. Allen, Watertown
So. Cal. V. M. A.....	3rd Wednesday Monthly.....	Los Angeles....	J. P. Bushong, Los Angeles
Southeastern Michigan V. M. Ass'n.....	2d Wednesday Jan.Apr.Jul.Oct.	.....	H. Preston Hoskins, Detroit

Name of Organization	Date of Next Meeting	Place of Meeting	Name and Address of Sec'y.
Southeastern States Vet Med. Ass'n	.....	.....	J. I. Handley, Atlanta
Southern Tier V. M. A.	.....	Binghamton	R. R. Birch, Ithaca, N. Y.
Southwestern Mich. Vet. Med. Ass'n	.....	.....	L. A. Winter, Eau Claire, Mich.
Tennessee Vet Med. Ass'n	.....	.....	F. R. Youree, Lebanon
Texas V. M. Ass'n	.....	Fort Worth	T. T. Christian, Waco.
Utah Vet. Med. Ass'n	October, each yr	Salt Lake City.	Hugh Hurst
Vermont Vet. Med. Ass'n	.....	.....	Geo. Stephens, White River Junction
Vet. Ass'n of Alberta	July and Dec.	.....	T. E. Leclaire, Calgary, Alta.
Vet. Club Dist. of Columbia	.....	.....	F. W. Grenfell, Wash'n, D. C.
Vet. Ass'n of Manitoba	.....	Winnipeg	Wm. Hilton, Winnipeg
Vet. Med. Ass'n of N. J.	Semiannually	Asbury Park	R. W. Butterworth, Paterson
V. M. Ass'n, New York City	1st Wed. ea. mo.	338 E. 26th St.	Dr. J. E. Crawford, Far Rockaway, N. Y.
Virginia State V. M. Ass'n	.....	Ocean View	W.G.Chrisman, Blacksb'g, Va.
Washington State Col. V. M. A.	1st & 3d Fri. eve.	Pullman	John H. Gooding, Pullman
Washington State V. M. A.	.....	.....	Carl Cozier, Bellingham
Washington Vet. Med. Ass'n	Fri. each week.	Wash., D. C.	L. C. Wambaugh, Wash., D.C.
Western N. Y. V. M. A.	.....	Buffalo	F. F. Fehr, Buffalo
Western Penn. Vet. Club	3d Tu. each mo.	Pittsburgh	Fred Wietzel, Pittsburgh
W. Virginia Vet. Med. Ass'n	.....	.....	E. Layne, Huntington, W.Va.
Wisconsin Vet. Med. Ass'n	.....	.....	W. A. Wolcott, Madison
York Co. (Pa.) V. M. A.	July 6th and 7th	York	E. S. Bausticker, York, Pa.

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